Jan 7/8/8 Access DB#

SEARCH REQUEST FORM

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(STIC)

Scientific and Technical Information Center

Requester's Full Name: Leigh Maier Examiner #: 77012 Date: 7-1-03
Art Unit: 1623 Phone Number 30 8-4525 Serial Number: 10/069,280
Mail Box and Bldg/Room Location: 7A03 8B19 (mailbox) Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

****

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Bib sheet attached

Inventors (please provide full names):

Earliest Priority Filing Date:

**For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

Please see what you can do with these claims.

3-OST = 3-O-sulfotransferase

Regarding claim 9, an "over-sulfated" heparan sulfate might apply — even if not prepared enzymatically.

Thanks,

Leigh

Jan Delaval
Reference Librarian
Biotechnology & Chemical Library
CM1 1E07 – 703-308-4498
jan.delaval@uspto.gov

****

STAFF USE ONLY

Searcher: Jan
Searcher Phone #: 4498
Searcher Location:
Date Searcher Picked Up: 7/6/03
Date Completed: 7/6/03
Searcher Prep & Review Time:
Clerical Prep Time: 20
Online Time: 135

Type of Search

NA Sequence (#)
AA Sequence (#)
Structure (#) ✓
Bibliographic ✓
Litigation
Fulltext
Patent Family
Other

Vendors and cost where applicable

STN ✓
Dialog
Questel/Orbit
Dr.Link
Lexis/Nexis
Sequence Systems
WWW/Internet
Other (specify)

PTO-1590 (8-01)

STIC Search Report
Biotech-Chem Library

STIC Database Tracking Number: 97818

TO: Leigh Maier **Location: 7a03 / 8b19** **Sunday, July 06, 2003** **Art Unit: 1623** **Phone: 308-4525** **Serial Number: 10 / 069280**	**From: Jan Delaval** **Location: Biotech-Chem Library** **CM1-1E07** **Phone: 308-4498** **jan.delaval@uspto.gov**

Search Notes

Jan Delaval
Reference Librarian
Biotechnology & Chemical Library
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jan.delaval@uspto.gov

```
=> fil reg
FILE 'REGISTRY' ENTERED AT 16:47:23 ON 06 JUL 2003
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Property values tagged with IC are from the ZIC/VINITI data file
provided by InfoChem.

STRUCTURE FILE UPDATES:    4 JUL 2003  HIGHEST RN 542812-68-0
DICTIONARY FILE UPDATES:   4 JUL 2003  HIGHEST RN 542812-68-0

TSCA INFORMATION NOW CURRENT THROUGH JANUARY 6, 2003

  Please note that search-term pricing does apply when
  conducting SmartSELECT searches.

Crossover limits have been increased.  See HELP CROSSOVER for details.

Experimental and calculated property data are now available.  See HELP
PROPERTIES for more information.  See STNote 27, Searching Properties
in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

=> d sta que l71
L66             STR
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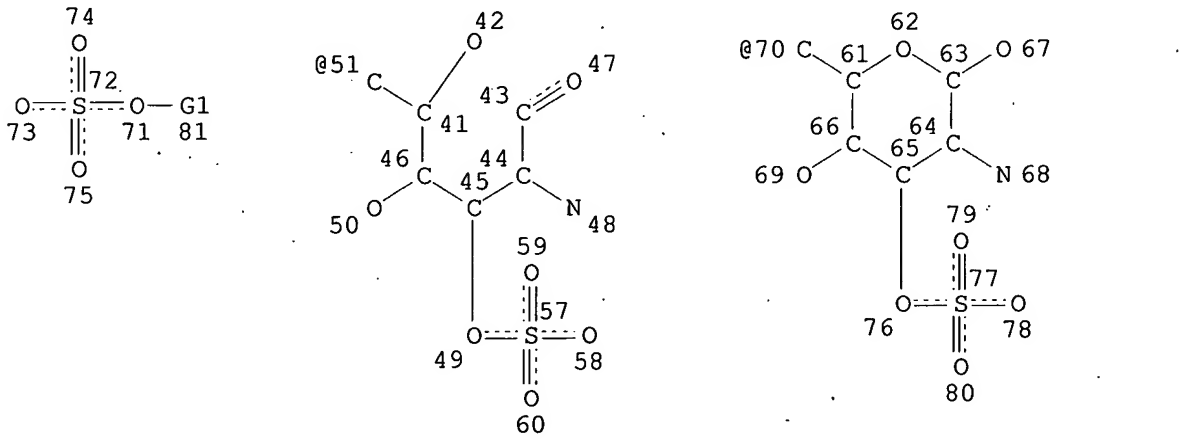


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NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS  36

STEREO ATTRIBUTES: NONE
L68          224 SEA FILE=REGISTRY SSS FUL L66
L69              STR
```

Jan Delaval
Reference Librarian
Biotechnology & Chemical Library
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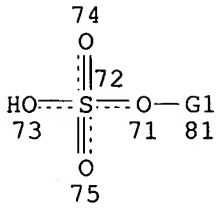
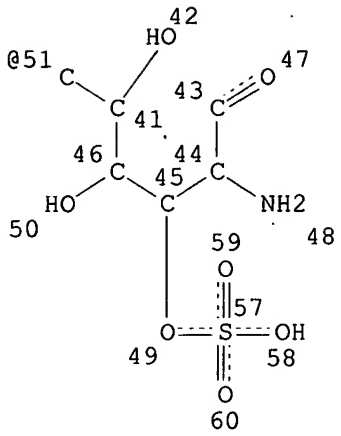
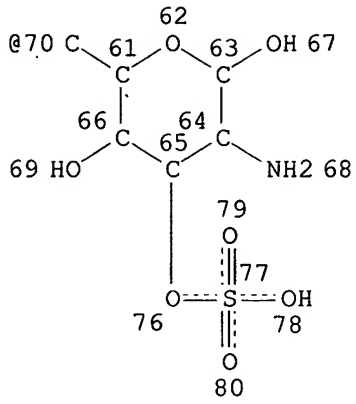
jan.delaval@uspto.gov







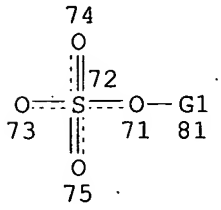
VAR G1=51/70
NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

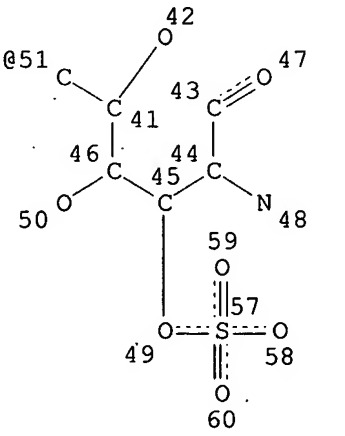
GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 36

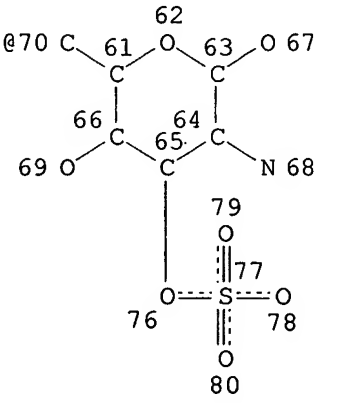
STEREO ATTRIBUTES: NONE
L71 4 SEA FILE=REGISTRY SUB=L68 SSS FUL L69

100.0% PROCESSED 224 ITERATIONS 4 ANSWERS
SEARCH TIME: 00.00.01

=> d sta que l75
L62 9 SEA FILE=REGISTRY ABB=ON PLU=ON C6H13NO11S2/MF
L63 3 SEA FILE=REGISTRY ABB=ON PLU=ON L62 NOT SULFOAMINO
L64 2 SEA FILE=REGISTRY ABB=ON PLU=ON L63 NOT IDS/CI
L65 1 SEA FILE=REGISTRY ABB=ON PLU=ON L64 AND 3
L66 STR





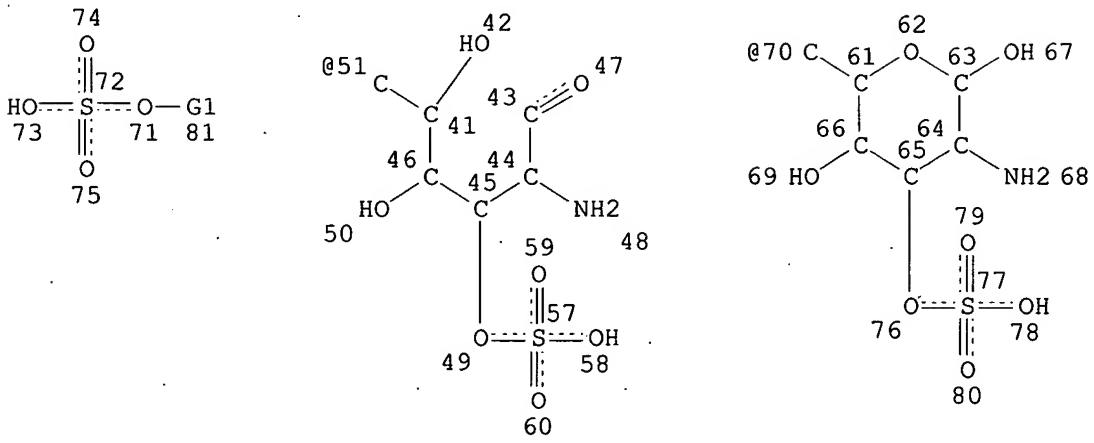


VAR G1=51/70
NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 36

STEREO ATTRIBUTES: NONE
L68 224 SEA FILE=REGISTRY SSS FUL L66
L69 STR



VAR G1=51/70
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DEFAULT MLEVEL IS ATOM
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GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 36

STEREO ATTRIBUTES: NONE
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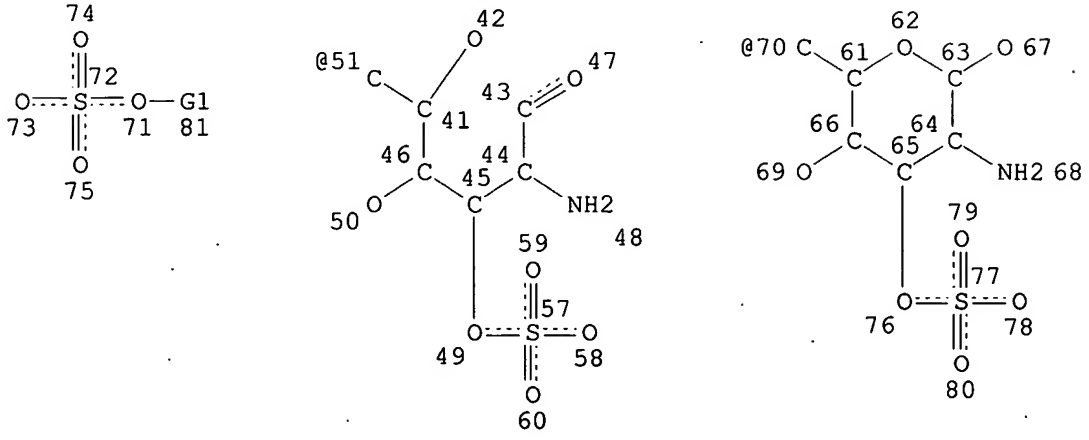
L72 STR



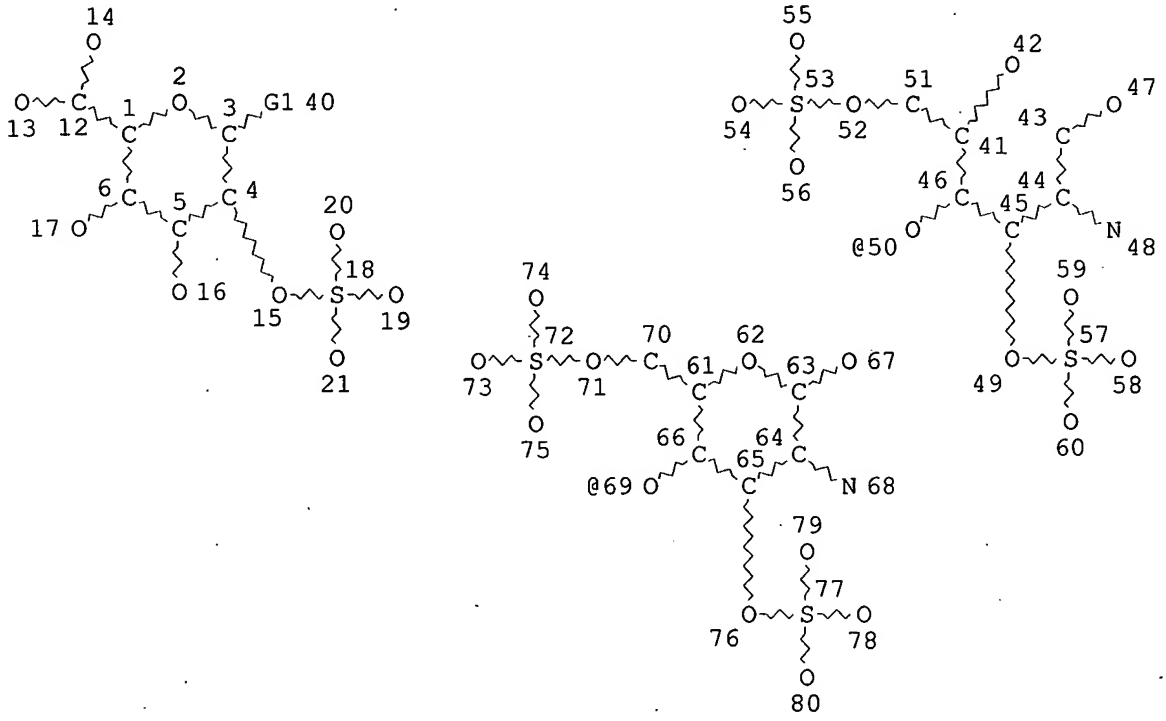
VAR G1=51/70
NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 36

STEREO ATTRIBUTES: NONE
L73 30 SEA FILE=REGISTRY SUB=L68 SSS FUL L72
L74 26 SEA FILE=REGISTRY ABB=ON PLU=ON L73 NOT (L71 OR L65)
L75 1 SEA FILE=REGISTRY ABB=ON PLU=ON L74 AND C12H21NO20S3

=> d sta que l61
L58 STR



VAR G1=50/69
NODE ATTRIBUTES:
DEFAULT MLEVEL IS ATOM
DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:
RING(S) ARE ISOLATED OR EMBEDDED
NUMBER OF NODES IS 57

STEREO ATTRIBUTES: NONE
L60 16 SEA FILE=REGISTRY SSS FUL L58
L61 1 SEA FILE=REGISTRY ABB=ON PLU=ON L60 AND C12H21NO20S3

=> d his

(FILE 'HOME' ENTERED AT 14:58:12 ON 06 JUL 2003)
SET COST OFF

FILE 'HCAPLUS' ENTERED AT 14:58:22 ON 06 JUL 2003
E WO2000-US23288/AP,PRN
L1 1 S E3
E US99-150743/AP,PRN
L2 1 S E5

```
                E US2000-175347/AP,PRN
L3            1 S E5
L4            1 S L1-L3
                E SHUKLA D/AU
L5          168 S E3-E12,E15,E16
                E ROSENBURG R/AU
L6            2 S E3,E4
                E ROSENBERG R/AU
L7          402 S E3,E8,E34,E40
                E SPEAR P/AU
L8          142 S E3,E6,E9,E10
L9            1 S L4 AND L5-L8
                SEL RN

     FILE 'REGISTRY' ENTERED AT 15:02:48 ON 06 JUL 2003
L10          14 S E1-E14
L11           6 S 67-68-5 OR 57-55-6 OR 67-63-0 OR 64-17-5 OR 112-80-1 OR 872-5
L12           1 S 9050-30-0
L13          14 S (70226-44-7 AND 7664-93-9)/CRN
L14           3 S L13 AND (CA OR NA OR K)/ELS AND 3/NC
L15           4 S L12,L14
L16           7 S L10 NOT L11-L15
L17           3 S L16 AND SQL/FA
L18           4 S L16 NOT L17
L19           1 S L18 AND UNSPECIFIED
L20           3 S L18 NOT L19

     FILE 'HCAPLUS' ENTERED AT 15:11:23 ON 06 JUL 2003
L21         703 S L5-L8 NOT L9

     FILE 'HCAPLUS' ENTERED AT 15:11:31 ON 06 JUL 2003
                SET SMARTSELECT ON
L22           SEL L21 1- RN :    1245 TERMS
                SET SMARTSELECT OFF

     FILE 'HCAPLUS' ENTERED AT 15:12:08 ON 06 JUL 2003
L24         703 S L21 OR L21
                SEL AN L24 1-200
L25         200 S E15-E406
                SEL AN L24 201-400
L26         200 S E407-E803
                DEL SEL
                SEL AN L24 401-600
L27         200 S E1-E400
                SEL AN L24 601-703
L28         103 S E401-E606

     FILE 'REGISTRY' ENTERED AT 15:15:14 ON 06 JUL 2003

     FILE 'HCAPLUS' ENTERED AT 15:15:14 ON 06 JUL 2003
                SET SMARTSELECT ON
L29           SEL L25 1- RN :     751 TERMS
                SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 15:15:16 ON 06 JUL 2003
L30         751 S L29

     FILE 'HCAPLUS' ENTERED AT 15:15:29 ON 06 JUL 2003
                SET SMARTSELECT ON
L31           SEL L26 1- RN :     321 TERMS
                SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 15:15:31 ON 06 JUL 2003
```

```
L32          322 S L31

     FILE 'HCAPLUS' ENTERED AT 15:15:40 ON 06 JUL 2003
                SET SMARTSELECT ON
L33          SEL L27 1- RN :     246 TERMS
                SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 15:15:41 ON 06 JUL 2003
L34          246 S L33

     FILE 'HCAPLUS' ENTERED AT 15:15:49 ON 06 JUL 2003
                SET SMARTSELECT ON
L35          SEL L28 1- RN :     108 TERMS
                SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 15:15:50 ON 06 JUL 2003
L36          108 S L35
L37         1245 S L30,L32,L34,L36
L38         1241 S L37 NOT L10
L39           58 S L38 AND OC5/ES
L40          188 S L38 AND S/ELS
L41          333 S L38 AND UNSPECIFIED
L42          144 S L41 NOT SQL/FA
L43            8 S L42 AND SULFOTRANSFERASE
L44            1 S L43 AND 3
L45          184 S L40 NOT L41
L46           54 S L45 AND L39
L47           14 S L46 NOT SULFOAMINO
L48            1 S L47 AND C12H21NO14S
L49          130 S L45 NOT L46
L50           96 S L49 NOT SQL/FA
L51            4 S L39 NOT L46-L50
L52            5 S L38 AND ?GLUC?/CNS NOT L39-L51
L53            1 S L20 AND OC5/ES
L54              STR
L55            0 S L54
L56              STR L54
L57            0 S L56
L58              STR L56
L59            0 S L58
L60           16 S L58 FUL
                SAV L60 MAIER069/A
L61            1 S L60 AND C12H21NO20S3
                SAV L61 MAIER069A/A
                E C6H13NO11S2/MF
L62            9 S E3
L63            3 S L62 NOT SULFOAMINO
L64            2 S L63 NOT IDS/CI
L65            1 S L64 AND 3
L66              STR L58
L67            9 S L66
L68          224 S L66 FUL
                SAV L68 MAIER069B/A
L69              STR L66
L70            0 S L69 SAM SUB=L68
L71            4 S L69 FUL SUB=L68
                SAV L71 MAIER069C/A
L72              STR L69
L73           30 S L72 FUL SUB=L68
                SAV L73 MAIER069D/A
L74           26 S L73 NOT L71,L65
L75            1 S L74 AND C12H21NO20S3
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     FILE 'HCAPLUS' ENTERED AT 16:04:08 ON 06 JUL 2003
L76           5 S L61,L65,L75
L77           2 S L76 AND (PY<=1999 OR PRY<=1999 OR AY<=1999)
L78          19 S 3 OST
L79          67 S 3 O ()(SULFOTRANSFERASE OR SULPHOTRANSFERASE OR (SULFO OR SUL
L80          70 S L78,L79
L81           5 S L80 (L) 3A
L82           4 S L80 (L) 3B
L83           7 S L81,L82
L84          21 S L80 AND L12
L85          40 S L80 AND HEPARAN()(SULFATE OR SULPHATE)
L86          40 S L84,L85
L87           4 S 3OST#
L88          42 S L83,L86,L87
L89          42 S L80 AND L88
L90          28 S L80 NOT L89
L91           1 S L90 AND HERPES SIMPLEX
                SEL RN L89
                DEL SEL

     FILE 'REGISTRY' ENTERED AT 16:12:03 ON 06 JUL 2003

     FILE 'HCAPLUS' ENTERED AT 16:12:03 ON 06 JUL 2003
                SET SMARTSELECT ON
L92          SEL L89 1- RN :    4962 TERMS
                SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 16:12:06 ON 06 JUL 2003
L93        4962 S L92
L94          63 S L93 AND (?SULFOTRANSFERASE? OR ?SULPHOTRANSFERASE?)/CNS
L95          61 S L94 AND (SULFOTRANSFERASE OR SULPHOTRANSFERASE)/INS.HP
L96           2 S L94 NOT L95
L97          47 S L95 AND 3
L98          13 S L95 AND (3A OR 3B)
L99          47 S L97,L98
L100         14 S L95 NOT L99
L101         41 S L99 AND (3 OR 3A OR 3B)/INS.HP
L102          6 S L99 NOT L101
L103          2 S L102 NOT (SQL/FA OR STEROID)
L104         38 S L101 AND HEPAR?
L105          3 S L101 NOT L104
L106          2 S L105 AND 3 O
L107         19 S L104 AND 3 O
L108          1 S L107 NOT (CLONE OR MUS OR MOUSE)
L109         19 S L104 NOT L107
L110          2 S L19,L103
L111        909 S SULFOTRANSFERASE OR SULPHOTRANSFERASE
L112        846 S L111 NOT L94
L113        136 S L112 AND 3
L114         13 S L112 AND 3 O
L115        123 S L113 NOT L114
L116          0 S L112 AND (3A OR 3B)

     FILE 'HCAPLUS' ENTERED AT 16:22:51 ON 06 JUL 2003
L117         34 S L110
L118         31 S L117 AND L78-L90
L120         15 S HEPARAN()(SULFATE OR SULPHATE)()(3 OR 3 O)()(SULFOTRANSFERASE
L121         73 S L78-L90,L117-L120
L122          6 S L121 AND ?HERPE?
                E HERPES/CT
                E E31+ALL
L123       2969 S E2
                E E2+ALL
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L124        4254 S E8
L125           9 S E6
                 E E6+ALL
L126        7223 S E9,E12
                 E E9+ALL
L127       10903 S E7,E9-E26/BI
L128        4250 S L12
L129        7432 S HEPARAN()(SULFATE OR SULPHATE)
L130       11444 S L123-L127
L131          39 S L130 AND L128
L132          82 S L130 AND L129
L133           1 S L77 AND L121
L134           1 S L77 AND L130
L135           2 S L77,L133,L134
                 E GLYCOPROTEIN/CT
L136         691 S E186,E187
L137        1024 S (GLYCOPROTEIN OR GP)(L)GD
L138           3 S L136,L137 AND L121
L139         672 S L136,L137 AND L130
L140         926 S L136,L137 AND (?HERPE? OR HSV?)
L141         708 S L139,L140 AND (PY<=1999 OR PRY<=1999 OR AY<=1999)
L142           0 S L141 AND (OVERSULFAT? OR OVERSULPHAT?)
                 E SULFATION/CT
                 E E3+ALL
L143           1 S L141 AND E3
L144          28 S L141 AND ?SACCHARIDE?
L145         130 S L5-L8 AND (?HERPE? OR HSV? OR L123-L127)
L146           6 S L145 AND ?SACCHARID?
L147          15 S L145 AND L128,L129
L148           4 S L145 AND L121
L149          19 S L146-L148
L150          15 S L149 AND (PY<=1999 OR PRY<=1999 OR AY<=1999)
L151           4 S L149 NOT L150
L152          20 S L150,L151,L135
L153         111 S L145 NOT L152
L154          10 S L152 AND (D OR GD)
L155          10 S L152 NOT L154
L156         163 S L129,L128 AND E3+NT
L157           2 S L156 AND L123-L127
L158           2 S L156 AND (?HERPE? OR HSV?)
L159           2 S L157,L158
L160          11 S L159,L154

    FILE 'REGISTRY' ENTERED AT 16:47:23 ON 06 JUL 2003

=> fil hcaplus
FILE 'HCAPLUS' ENTERED AT 16:48:24 ON 06 JUL 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
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FILE COVERS 1907 - 6 Jul 2003 VOL 139 ISS 2

FILE LAST UPDATED: 4 Jul 2003 (20030704/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d l160 all hitstr tot

L160 ANSWER 1 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 2002:743069 HCAPLUS
DN 138:102854
TI **Heparan Sulfate 3-O-Sulfotransferase** Isoform 5 Generates Both an Antithrombin-Binding Site and an Entry Receptor for **Herpes Simplex Virus, Type 1**
AU Xia, Guoqing; Chen, Jinghua; Tiwari, Vaibhav; Ju, Wujian; Li, Jin-Ping; Malmstrom, Anders; **Shukla, Deepak**; Liu, Jian
CS Cell and Molecular Biology, Biomedical Center C13, Lund University, Lund, S-22184, Swed.
SO Journal of Biological Chemistry (2002), 277(40), 37912-37919
CODEN: JBCHA3; ISSN: 0021-9258
PB American Society for Biochemistry and Molecular Biology
DT Journal
LA English
CC 7-5 (Enzymes)
Section cross-reference(s): 6, 10
AB **Heparan sulfate 3-O-sulfotransferase** transfers sulfate to the 3-OH position of a glucosamine residue of **heparan sulfate** (HS) to form 3-O-sulfated HS. The 3-O-sulfated glucosamine residue contributes to two important biol. functions of HS: binding to antithrombin and thereby carrying anticoagulant activity, and binding to **herpes** simplex viral envelope glycoprotein **D** to serve as an entry receptor for **herpes simplex virus 1**. A total of five HS **3-O-sulfotransferase** isoforms were reported previously. Here we report the isolation and characterization of a novel HS **3-O-sulfotransferase** isoform, designated as HS **3-O-sulfotransferase** isoform 5 (**3-OST**-5). **3-OST**-5 cDNA was isolated from a human placenta cDNA library and expressed in COS-7 cells. The **disaccharide** anal. of **3-OST**-5-modified HS revealed that **3-OST**-5 generated at least three 3-O-sulfated **disaccharides** as follows: IdoUA2S-AnMan3S, GlcUA-AnMan3S6S, and IdoUA2S-AnMan3S6S. Transfection of the plasmid expressing **3-OST**-5 rendered wild type Chinese hamster ovary cells susceptible to the infection by **herpes simplex virus 1**, suggesting that **3-OST**-5-modified HS serves as an entry receptor for **herpes simplex virus 1**. In addn., **3-OST**-5-modified HS bound to **herpes** simplex viral envelope protein glycoprotein **D**. Furthermore, we found that **3-OST**-5-modified HS also bound to antithrombin, suggesting that **3-OST**-5 also produces anticoagulant HS. In summary, our results indicate that a new member of **3-OST** family generates both anticoagulant HS and an entry receptor for **herpes simplex virus 1**. These results provide a new insight regarding the mechanism for the biosynthesis of biol. active HS.
ST sulfotransferase 5 **heparan sulfate** protein sequence; **heparan sulfate** human **herpes simplex virus 1** receptor antithrombin
IT Envelope proteins
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(D; **heparan sulfate** modification by

heparan sulfate 3-O-sulfotransferase isoform 5 resulting in antithrombin and **herpes simplex virus 1** binding)

IT Human
Muscle
Protein sequences
Transcriptional regulation
cDNA sequences
(cloning sequencing and tissue expression of human **heparan sulfate 3-O-sulfotransferase** isoform 5 cDNA)

IT Protein motifs
(glycosylation site; cloning sequencing and tissue expression of human **heparan sulfate 3-O-sulfotransferase** isoform 5 cDNA)

IT Anticoagulants
Human herpesvirus 1
Molecular association
(**heparan sulfate** modification by **heparan sulfate 3-O-sulfotransferase** isoform 5 resulting in antithrombin and **herpes simplex virus 1** binding)

IT Protein motifs
(transmembrane domain; cloning sequencing and tissue expression of human **heparan sulfate 3-O-sulfotransferase** isoform 5 cDNA)

IT 119692-05-6 130795-98-1 488704-69-4
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(HS fragment; **heparan sulfate** modification by **heparan sulfate 3-O-sulfotransferase** isoform 5 resulting in antithrombin and **herpes simplex virus 1** binding)

IT 479474-87-8
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(amino acid sequence; cloning sequencing and tissue expression of human **heparan sulfate 3-O-sulfotransferase** isoform 5 cDNA)

IT 9000-94-6, Antithrombin
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(**heparan sulfate** modification by **heparan sulfate 3-O-sulfotransferase** isoform 5 resulting in antithrombin and **herpes simplex virus 1** binding)

IT **9050-30-0, Heparan sulfate**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(**heparan sulfate** modification by **heparan sulfate 3-O-sulfotransferase** isoform 5 resulting in antithrombin and **herpes simplex virus 1** binding)

IT **183257-54-7, Heparan sulfate 3-O-sulfotransferase**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(isoform 5; cloning sequencing and tissue expression of human **heparan sulfate 3-O-sulfotransferase** isoform 5 cDNA)

IT 459780-76-8
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(nucleotide sequence; cloning sequencing and tissue expression of human **heparan sulfate 3-O-**

sulfotransferase isoform 5 cDNA)
RE.CNT 40 THERE ARE 40 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Aikawa, J; J Biol Chem 2001, V276, P5876 HCAPLUS
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IT **9050-30-0, Heparan sulfate**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(**heparan sulfate** modification by **heparan sulfate 3-O-sulfotransferase** isoform 5 resulting in antithrombin and **herpes simplex virus 1** binding)
RN 9050-30-0 HCAPLUS
CN Heparan, sulfate (9CI) (CA INDEX NAME)

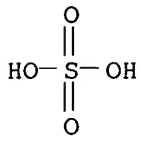
CM 1

CRN 70226-44-7
CMF Unspecified
CCI MAN

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CM 2

CRN 7664-93-9
CMF H2 O4 S



IT **183257-54-7, Heparan sulfate 3-O-sulfotransferase**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(isoform 5; cloning sequencing and tissue expression of human **heparan sulfate 3-O-sulfotransferase** isoform 5 cDNA)
RN 183257-54-7 HCAPLUS
CN Sulfotransferase, heparitin 3- (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L160 ANSWER 2 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 2001:775449 HCAPLUS
DN 136:33840
TI Portable sulphotransferase domain determines sequence specificity of **heparan sulphate 3-O-sulphotransferases**
AU Yabe, Tomio; **Shukla, Deepak; Spear, Patricia G.; Rosenberg, Robert D.**; Seeberger, Peter H.; Shworak, Nicholas W.
CS Angiogenesis Research Center, Department of Medicine, Harvard Medical School, Beth Israel Deaconess Medical Center, Boston, MA, 02215, USA
SO Biochemical Journal (2001), 359(1), 235-241
CODEN: BIJOAK; ISSN: 0264-6021
PB Portland Press Ltd.
DT Journal
LA English
CC 7-5 (Enzymes)
AB 3-O-Sulfates are the rarest substituent of **heparan sulfate** and are therefore ideally suited to the selective regulation of biol. activities. Individual isoforms of **heparan sulfate** D-glucosaminyl **3-O-sulfotransferase** (**3-OST**) exhibit sequence-specific action, which creates **heparan sulfate** structures with distinct biol. functions. For example, **3-OST**-1 preferentially generates binding sites for anti-thrombin, whereas **3-OST**-3 isoforms create binding sites for the **gD** envelope protein of **herpes simplex virus 1** (**HSV-1**), which enables viral entry. **3-OST** enzymes comprise a presumptive sulfotransferase domain and a divergent N-terminal region. To localize determinants of sequence specificity, we conducted domain swaps between cDNA species. The N-terminal region of **3-OST**-1 was fused with the sulfotransferase domain of **3-OST-3A** to generate N1-ST3A. Similarly, the N-terminal region of **3-OST-3A** was fused to the sulfotransferase domain of **3-OST**-1 to generate N3A-ST1. Wild-type and chimeric enzymes were transiently expressed in COS-7 cells and exts. were analyzed for selective generation of binding sites for anti-thrombin. **3-OST**-1 was 270-fold more efficient at forming anti-thrombin-binding sites than **3-OST-3A**,

indicating its significantly greater selectivity for substrates that can be 3-O-sulfated to yield such sites. N3A-ST1 was as active as **3-OST-1**, whereas the activity of N1-ST3A was as low as that of **3-OST-3A**. Anal. of Chinese hamster ovary cell transfectants revealed that only **3-OST-3A** and N1-ST3A generated **gD**-binding sites and conveyed susceptibility to infection by **HSV-1**. Thus sequence-specific properties of **3-OSTs** are defined by a self-contained sulfotransferase domain and are not directly influenced by the divergent N-terminal region.

ST sulfotransferase domain **heparan sulfate**

IT Protein sequences
(alignment, sulfotransferases; chimeric enzyme studies of sequence specificity of **heparan sulfate 3-O-sulfotransferases**)

IT Enzyme functional sites
(chimeric enzyme studies of sequence specificity of **heparan sulfate 3-O-sulfotransferases**)

IT 9000-94-6, Antithrombin
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(chimeric enzyme studies of sequence specificity of **heparan sulfate 3-O-sulfotransferases**)

IT **183257-54-7, Heparan sulfate D-glucosaminyl 3-O-sulfotransferase**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(chimeric enzyme studies of sequence specificity of **heparan sulfate 3-O-sulfotransferases**)

RE.CNT 45 THERE ARE 45 CITED REFERENCES AVAILABLE FOR THIS RECORD

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IT **183257-54-7, Heparan sulfate D -glucosaminyl 3-O-sulfotransferase**
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(chimeric enzyme studies of sequence specificity of **heparan sulfate 3-O-sulfotransferases**)

RN 183257-54-7 HCAPLUS
CN Sulfotransferase, heparitin 3- (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

L160 ANSWER 3 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 2001:620938 HCAPLUS
DN 135:342175
TI **Herpesviruses** and **heparan sulfate**: an intimate relationship in aid of viral entry
AU **Shukla, Deepak; Spear, Patricia G.**
CS Department of Microbiology-Immunology, Northwestern University Medical School, Chicago, IL, 60611, USA
SO Journal of Clinical Investigation (2001), 108(4), 503-510
CODEN: JCINAO; ISSN: 0021-9738
PB American Society for Clinical Investigation
DT Journal; General Review
LA English
CC 14-0 (Mammalian Pathological Biochemistry)
Section cross-reference(s): 10
AB A review with 52 refs. Topics discussed include the family of **herpesviruses**; clin. manifestations of **herpesvirus** diseases in humans; pathways of **herpesvirus** entry into cells; **heparan sulfate** as the initial receptor for the binding of **herpesviruses** to cells; mol. interactions between **herpesvirus** glycoproteins and **heparan sulfate**; **heparan sulfate** as an entry receptor; and implications of **herpesvirus** binding to **heparan sulfate** for pathogenesis.
ST review **herpesvirus** infection **heparan sulfate**
IT Glycoproteins, specific or class
RL: ADV (Adverse effect, including toxicity); BIOL (Biological study)
(gB; interaction between **heparan sulfate** and viral surface glycoproteins in **herpesvirus** infection)
IT Glycoproteins, specific or class
RL: ADV (Adverse effect, including toxicity); BIOL (Biological study)
(gC; interaction between **heparan sulfate** and viral surface glycoproteins in **herpesvirus** infection)
IT Glycoproteins, specific or class
RL: ADV (Adverse effect, including toxicity); BIOL (Biological study)
(**gD**; interaction between **heparan sulfate** and viral surface glycoproteins in **herpesvirus** infection)
IT Human **herpesvirus**
(interaction between **heparan sulfate** and viral surface glycoproteins in **herpesvirus** infection)

IT Infection
(viral; interaction between **heparan sulfate** and viral surface glycoproteins in **herpesvirus** infection)
IT **9050-30-0, Heparan sulfate**
RL: ADV (Adverse effect, including toxicity); BIOL (Biological study)
(interaction between **heparan sulfate** and viral surface glycoproteins in **herpesvirus** infection)
RE.CNT 52 THERE ARE 52 CITED REFERENCES AVAILABLE FOR THIS RECORD
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IT **9050-30-0, Heparan sulfate**
RL: ADV (Adverse effect, including toxicity); BIOL (Biological study)

(interaction between **heparan sulfate** and viral surface glycoproteins in **herpesvirus** infection)
RN 9050-30-0 HCAPLUS
CN Heparan, sulfate (9CI) (CA INDEX NAME)

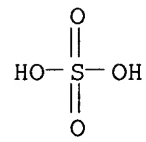
CM 1

CRN 70226-44-7
CMF Unspecified
CCI MAN

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CM 2

CRN 7664-93-9
CMF H2 O4 S



L160 ANSWER 4 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 2001:152481 HCAPLUS
DN 134:212717
TI Pharmaceutical preparations for the inhibition of **herpes simplex virus 1** entry
IN **Shukla, Deepak**; Liu, Jian; **Rosenberg, Robert D.**; **Spear, Patricia G.**
PA Massachusetts Institute of Technology, USA; Northwestern University
SO PCT Int. Appl., 29 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM A61K031-00
CC 63-6 (Pharmaceuticals)
Section cross-reference(s): 1
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2001013910	A2	20010301	WO 2000-US23288	20000825 <--
WO 2001013910	A3	20011101		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

PRAI US 1999-150743P P 19990825 <--
US 2000-175347P P 20000110
AB Disclosed herein are **polysaccharide** prepns. enriched in **3-OST**-3 modified **heparan sulfate**.
Also disclosed are methods of treating **herpes** simplex viral type-1 infection using the pharmaceutical prepns. of the invention.
ST **herpes HSV1** virustat **heparan sulfate**

deriv
IT Drug delivery systems
(foams; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Glycoproteins, specific or class
RL: BOC (Biological occurrence); BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); OCCU (Occurrence); PROC (Process)
(**gD**; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Drug delivery systems
(gels; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Drug delivery systems
(liniments; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Drug delivery systems
(lotions; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Drug delivery systems
(ointments, creams; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Drug delivery systems
(ointments; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Skin
(permeation of; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Antiviral agents
Human herpesvirus 1
Molecular cloning
Permeation enhancers
Transformation, genetic
(**polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT **Polysaccharides**, biological studies
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PEP (Physical, engineering or chemical process); THU (Therapeutic use); BIOL (Biological study); OCCU (Occurrence); PROC (Process); USES (Uses)
(**polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Drug delivery systems
(slow-release, polymers; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT Drug delivery systems
(suppositories; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT **183257-54-7, Heparan sulfate 3-sulfotransferase**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(isoform **3-OST-3**; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
IT 67-63-0, Isopropanol, biological studies 872-50-4, N-Methylpyrrolidone, biological studies
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(**polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)

IT 3416-24-8D, Glucosamine, sulfate derivs. **76330-21-7**
328085-46-7 328085-46-7D, glycoside derivs.
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PEP (Physical, engineering or chemical process); THU (Therapeutic use); BIOL (Biological study); OCCU (Occurrence); PROC (Process); USES (Uses)
(**polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)

IT **9050-30-0, Heparan sulfate**
RL: PEP (Physical, engineering or chemical process); THU (Therapeutic use); BIOL (Biological study); PROC (Process); USES (Uses)
(**polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)

IT 57-55-6, Propylene glycol, biological studies 64-17-5, Ethanol, biological studies 67-68-5, Dmso, biological studies 112-80-1, Oleic acid, biological studies
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(skin permeation enhancer; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)

IT 328319-66-0 328319-67-1 328319-68-2
RL: PRP (Properties)
(unclaimed protein sequence; pharmaceutical prepns. for the inhibition of **herpes simplex virus 1** entry)

RE.CNT 50 THERE ARE 50 CITED REFERENCES AVAILABLE FOR THIS RECORD

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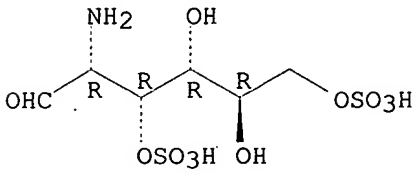
IT **183257-54-7, Heparan sulfate 3-sulfotransferase**
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); BIOL (Biological study)
(isoform **3-OST**-3; **polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
RN 183257-54-7 HCAPLUS
CN Sulfotransferase, heparitin 3- (9CI) (CA INDEX NAME)

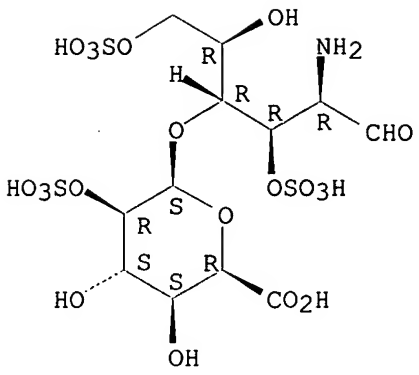
*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
IT **76330-21-7 328085-46-7 328085-46-7D**, glycoside derivs.
RL: BOC (Biological occurrence); BSU (Biological study, unclassified); PEP (Physical, engineering or chemical process); THU (Therapeutic use); BIOL (Biological study); OCCU (Occurrence); PROC (Process); USES (Uses)
(**polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
RN 76330-21-7 HCAPLUS
CN D-Glucose, 2-amino-2-deoxy-, 3,6-bis(hydrogen sulfate) (9CI) (CA INDEX NAME)

Absolute stereochemistry.



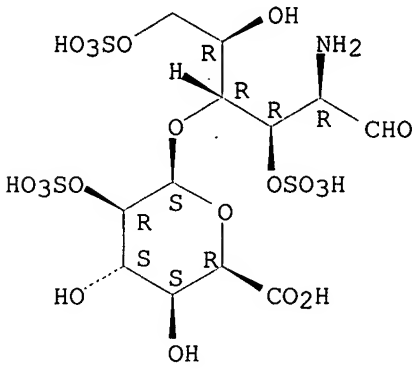
RN 328085-46-7 HCAPLUS
CN D-Glucose, 2-amino-2-deoxy-4-O-(2-O-sulfo-.beta.-L-idopyranuronosyl)-, 3,6-bis(hydrogen sulfate) (9CI) (CA INDEX NAME)

Absolute stereochemistry.



RN 328085-46-7 HCAPLUS
CN D-Glucose, 2-amino-2-deoxy-4-O-(2-O-sulfo-.beta.-L-idopyranuronosyl)-, 3,6-bis(hydrogen sulfate) (9CI) (CA INDEX NAME)

Absolute stereochemistry.



IT **9050-30-0, Heparan sulfate**
RL: PEP (Physical, engineering or chemical process); THU (Therapeutic use); BIOL (Biological study); PROC (Process); USES (Uses)
(**polysaccharide** prepns. for the inhibition of **herpes simplex virus 1** entry)
RN 9050-30-0 HCAPLUS
CN Heparan, sulfate (9CI) (CA INDEX NAME)

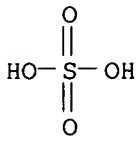
CM 1

CRN 70226-44-7
CMF Unspecified
CCI MAN

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CM 2

CRN 7664-93-9
CMF H2 O4 S



L160 ANSWER 5 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 2001:16328 HCAPLUS
DN 134:219618
TI Cell fusion induced by **herpes** simplex virus glycoproteins gB, **gD**, and gH-gL requires a **gD** receptor but not necessarily **heparan sulfate**
AU Pertel, Peter E.; Fridberg, Alina; Parish, Mary L.; **Spear, Patricia G.**
CS Department of Medicine, Division of Infectious Diseases, Northwestern University Medical School, Chicago, IL, 60611, USA
SO Virology (2001), 279(1), 313-324
CODEN: VIRLAX; ISSN: 0042-6822
PB Academic Press
DT Journal
LA English
CC 10-6 (Microbial, Algal, and Fungal Biochemistry)
AB To characterize cellular factors required for **herpes simplex virus type 1** (**HSV-1**)-induced cell fusion, we used an efficient and quant. assay relying on expression of **HSV-1** glycoproteins in transfected cells. We showed the following: (1) Cell fusion depended not only on expression of four viral glycoproteins (gB, **gD**, and gH-gL), as previously shown, but also on expression of cell surface entry receptors specific for **gD**. (2) Cell fusion required expression of all four glycoproteins in the same cell. (3) **Heparan sulfate** was not required for cell fusion. (4) Coexpression of receptor with the four glycoproteins in the same cell reduced fusion activity, indicating that interaction of **gD** and receptor can limit polykaryocyte formation. Overall, the viral and cellular determinants of **HSV-1**-induced cell fusion are similar to those for viral entry, except that **HSV-1** entry is significantly enhanced by binding of virus to cell surface **heparan sulfate**. (c) 2001 Academic Press.
ST **herpes** simplex virus glycoprotein cell fusion **heparan sulfate**
IT Cell fusion
Human herpesvirus 1
(cell fusion induced by **herpes** simplex virus glycoproteins gB, **gD**, and gH-gL requires **gD** receptor but not necessarily **heparan sulfate**)
IT Receptors
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(cell fusion induced by **herpes** simplex virus glycoproteins gB, **gD**, and gH-gL requires **gD** receptor but not necessarily **heparan sulfate**)
IT Glycoproteins, specific or class
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(gB; cell fusion induced by **herpes** simplex virus glycoproteins gB, **gD**, and gH-gL requires **gD** receptor but not necessarily **heparan sulfate**)
IT Glycoproteins, specific or class
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(**gD**; cell fusion induced by **herpes** simplex virus glycoproteins gB, **gD**, and gH-gL requires **gD**

receptor but not necessarily **heparan sulfate**)
IT Glycoproteins, specific or class
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(gH-gL; cell fusion induced by **herpes** simplex virus glycoproteins gB, **gD**, and gH-gL requires **gD** receptor but not necessarily **heparan sulfate**)
IT **9050-30-0, Heparan sulfate**
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(cell fusion induced by **herpes** simplex virus glycoproteins gB, **gD**, and gH-gL requires **gD** receptor but not necessarily **heparan sulfate**)
RE.CNT 71 THERE ARE 71 CITED REFERENCES AVAILABLE FOR THIS RECORD
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IT **9050-30-0, Heparan sulfate**
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(cell fusion induced by **herpes** simplex virus glycoproteins gB, **gD**, and gH-gL requires **gD** receptor but not necessarily **heparan sulfate**)
RN 9050-30-0 HCAPLUS
CN Heparan, sulfate (9CI) (CA INDEX NAME)

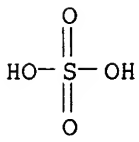
CM 1

CRN 70226-44-7
CMF Unspecified
CCI MAN

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CM 2

CRN 7664-93-9
CMF H2 O4 S



L160 ANSWER 6 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 1999:673913 HCAPLUS
DN 132:21694
TI A novel role for 3-O-sulfated **heparan sulfate** in **herpes simplex virus 1** entry
AU **Shukla, Deepak**; Liu, Jian; Blaiklock, Peter; Shworak, Nicholas W.; Bai, Xiaomei; Esko, Jeffrey D.; Cohen, Gary H.; Eisenberg, Roselyn J.; **Rosenberg, Robert D.**; **Spear, Patricia G.**
CS Department of Microbiology-Immunology, Northwestern University Medical School, Chicago, IL, 60611, USA
SO Cell (Cambridge, Massachusetts) (**1999**), 99(1), 13-22
CODEN: CELLB5; ISSN: 0092-8674

PB Cell Press
DT Journal
LA English
CC 14-3 (Mammalian Pathological Biochemistry)
Section cross-reference(s): 3, 7, 10
AB **Herpes simplex virus type** 1 (**HSV-1**) binds to cells through interactions of viral glycoproteins gB and gC with **heparan sulfate** chains on cell surface proteoglycans. This binding is not sufficient for viral entry, which requires fusion between the viral envelope and cell membrane. Here, the authors show that **heparan sulfate** modified by a subset of the multiple **D**-glucosaminyl **3-O-sulfotransferase** isoforms provides sites for the binding of a third viral glycoprotein, **gD**, and for initiation of **HSV-1** entry. The authors conclude that susceptibility of cells to **HSV-1** entry depends on (1) presence of **heparan sulfate** chains to which virus can bind and (2) 3-O-sulfation of specific glucosamine residues in **heparan sulfate** to generate **gD**-binding sites or the expression of other previously identified **gD**-binding receptors.
ST sulfated **heparan sulfate herpes simplex virus 1** entry; glucosaminyl sulfotransferase cDNA sequence mouse
IT **Sulfation**
(biol.; **heparan sulfate** 3-O-sulfated by **D**-glucosaminyl **3-O-sulfotransferases** provides sites for binding by glycoprotein **gD** for **herpes simplex virus 1** entry)
IT Mouse (Mus musculus)
Protein sequences
cDNA sequences
(cDNA sequence of mouse **D**-glucosaminyl **3-O-sulfotransferase** isoenzyme **3B**)
IT Receptors
RL: BOC (Biological occurrence); BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence); PROC (Process)
(for glycoprotein **gD**; **heparan sulfate** 3-O-sulfated by **D**-glucosaminyl **3-O-sulfotransferases** provides sites for binding by glycoprotein **gD** for **herpes simplex virus 1** entry)
IT Glycoproteins, specific or class
RL: ADV (Adverse effect, including toxicity); BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(**gD**; **heparan sulfate** 3-O-sulfated by **D**-glucosaminyl **3-O-sulfotransferases** provides sites for binding by glycoprotein **gD** for **herpes simplex virus 1** entry)
IT **Human herpesvirus 1**
Molecular association
(**heparan sulfate** 3-O-sulfated by **D**-glucosaminyl **3-O-sulfotransferases** provides sites for binding by glycoprotein **gD** for **herpes simplex virus 1** entry)
IT Proteoglycans, biological studies
RL: ADV (Adverse effect, including toxicity); BOC (Biological occurrence); BPR (Biological process); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); OCCU (Occurrence); PROC (Process)
(heparitin sulfate-contg., 3-O-sulfated; **heparan**

sulfate 3-O-sulfated by **D**-glucosaminyl **3-O-sulfotransferases** provides sites for binding by glycoprotein **gD** for **herpes simplex virus 1** entry)

IT Infection
(viral; **heparan sulfate** 3-O-sulfated by **D**-glucosaminyl **3-O-sulfotransferases** provides sites for binding by glycoprotein **gD** for **herpes simplex virus 1** entry)

IT 251924-96-6
RL: PRP (Properties)
(amino acid sequence; cDNA sequence of mouse **D**-glucosaminyl **3-O-sulfotransferase** isoenzyme **3B**
)

IT **183257-54-7, Heparan sulfate D**-glucosaminyl **3-O-sulfotransferase**
RL: ADV (Adverse effect, including toxicity); BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence)
(**heparan sulfate** 3-O-sulfated by **D**-glucosaminyl **3-O-sulfotransferases** provides sites for binding by glycoprotein **gD** for **herpes simplex virus 1** entry)

IT **9050-30-0D, Heparan sulfate**, 3-O-sulfated
RL: ADV (Adverse effect, including toxicity); BOC (Biological occurrence); BPR (Biological process); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); OCCU (Occurrence); PROC (Process)
(**heparan sulfate** 3-O-sulfated by **D**-glucosaminyl **3-O-sulfotransferases** provides sites for binding by glycoprotein **gD** for **herpes simplex virus 1** entry)

IT 245809-58-9, GenBank AF168992
RL: PRP (Properties)
(nucleotide sequence; cDNA sequence of mouse **D**-glucosaminyl **3-O-sulfotransferase** isoenzyme **3B**
)

RE.CNT 48 THERE ARE 48 CITED REFERENCES AVAILABLE FOR THIS RECORD.
RE

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IT **183257-54-7, Heparan sulfate D**
-glucosaminyl **3-O-sulfotransferase**
RL: ADV (Adverse effect, including toxicity); BAC (Biological activity or effector, except adverse); BOC (Biological occurrence); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); OCCU (Occurrence)
(**heparan sulfate** 3-O-sulfated by **D**
-glucosaminyl **3-O-sulfotransferases**
provides sites for binding by glycoprotein **gD** for
herpes simplex virus 1 entry)

RN 183257-54-7 HCAPLUS
CN Sulfotransferase, heparitin 3- (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IT **9050-30-0D, Heparan sulfate,** 3-O-sulfated
RL: ADV (Adverse effect, including toxicity); BOC (Biological occurrence); BPR (Biological process); BSU (Biological study, unclassified); MFM (Metabolic formation); BIOL (Biological study); FORM (Formation, nonpreparative); OCCU (Occurrence); PROC (Process)
(**heparan sulfate** 3-O-sulfated by **D**
-glucosaminyl **3-O-sulfotransferases**
provides sites for binding by glycoprotein **gD** for
herpes simplex virus 1 entry)

RN 9050-30-0 HCAPLUS
CN Heparan, sulfate (9CI) (CA INDEX NAME)

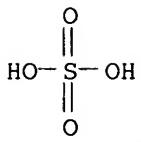
CM 1

CRN 70226-44-7
CMF Unspecified
CCI MAN

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CM 2

CRN 7664-93-9
CMF H2 O4 S



L160 ANSWER 7 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 1997:465326 HCAPLUS
DN 127:187154
TI Glycoprotein **D** of **herpes** simplex virus (**HSV**) binds directly to HVEM, a member of the tumor necrosis factor receptor superfamily and a mediator of **HSV** entry
AU Whitbeck, J. Charles; Peng, Charline; Lou, Huan; Xu, Ruliang; Willis, Sharon H.; Ponce de Leon, Manuel; Peng, Tao; Nicola, Anthony V.; Montgomery, Rebecca I.; Warner, Morgyn S.; Soulika, Athena M.; Spruce, Lynn A.; Moore, William T.; Lambris, John D.; **Spear, Patricia G.**; Cohen, Gary H.; Eisenberg, Roselyn J.
CS School of Dental Medicine, Center for Oral health Research, Schoolof Veterinary Medicine and School of Medicine, University of Pennsylvania, Philadelphia, PA, 19104, USA
SO Journal of Virology (**1997**), 71(8), 6083-6093
CODEN: JOVIAM; ISSN: 0022-538X
PB American Society for Microbiology
DT Journal
LA English
CC 6-3 (General Biochemistry)
Section cross-reference(s): 3, 10, 15
AB Glycoprotein **D** (**gD**) is a structural component of the **herpes** simplex virus (**HSV**) envelope which is essential for virus entry into host cells. Chinese hamster ovary (CHO-K1) cells are one of the few cell types which are nonpermissive for the entry of many **HSV** strains. However, when these cells are transformed with the gene for the **herpesvirus** entry mediator (HVEM), the resulting cells, CHO-HVEM12, are permissive for many **HSV** strains, such as **HSV-1**(KOS). By virtue of its four cysteine-rich pseudorepeats, HVEM is a member of the tumor necrosis factor superfamily of proteins. Recombinant forms of **gD** and HVEM, **gD**-1(306t) and HVEM(200t), resp., were used to demonstrate a specific phys. interaction between these two proteins. This interaction was dependent on native **gD** conformation but independent of its N-linked **oligosaccharides**, as expected from previous structure-function studies. Recombinant forms of **gD** derived from **HSV-1**(KOS)rid1 and **HSV-1**(ANG) did not bind to HVEM(200t), explaining the inability of these viruses to infect CHO-HVEM12 cells. A variant **gD** protein, **gD**-1(.DELTA.290-299t), showed enhanced binding to HVEM(200t) relative to the binding of **gD**-1(306t). Competition studies showed that **gD**-1(.DELTA.290-299t) and **gD**-1(306t) bound to the same region of HVEM(200t), suggesting that the differences in binding to HVEM are due to differences in affinity. These differences were also reflected in the ability of **gD**-1(.DELTA.290-299t) but not **gD**-1(306t) to block **HSV** type 1 infection of CHO-HVEM12 cells. By gel filtration chromatog., the complex between **gD**-1(.DELTA.290-299t) and HVEM(200t) had a mol. mass of 113 kDa and a molar ratio of 1:2. We conclude that HVEM interacts directly with **gD**, suggesting that HVEM is a receptor for virion **gD** and that the interaction between these proteins is a step in **HSV** entry into HVEM-expressing cells.
ST **HSV** glycoprotein **D** HVEM interaction;

herpesvirus entry mediator glycoprotein **D** interaction

IT Proteins, specific or class
RL: BPN (Biosynthetic preparation); BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PREP (Preparation); PROC (Process)
(HVEM (**herpesvirus** entry mediator); HVEM interacts directly with glycoprotein **gD**, suggesting that HVEM is a receptor for the **herpes** simplex virus **gD**, and interaction between these proteins is a step in **herpes** simplex virus entry)

IT Glycoproteins, specific or class
RL: BPN (Biosynthetic preparation); BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PREP (Preparation); PROC (Process)
(**gD**; HVEM interacts directly with glycoprotein **gD**, suggesting that HVEM is a receptor for the **herpes** simplex virus **gD**, and interaction between these proteins is a step in **herpes** simplex virus entry)

IT Human **herpesvirus**
Molecular cloning
(glycoprotein **D** of **herpes** simplex virus (**HSV**) binds directly to HVEM, a member of the tumor necrosis factor receptor superfamily and a mediator of **HSV** entry)

IT Tumor necrosis factor receptors
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(glycoprotein **D** of **herpes** simplex virus (**HSV**) binds directly to HVEM, a member of the tumor necrosis factor receptor superfamily and a mediator of **HSV** entry)

L160 ANSWER 8 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 1995:361806 HCAPLUS
DN 122:156187
TI Identification of structural features of heparin required for inhibition of **herpes simplex virus type 1** binding
AU Herold, Betsy C.; Gerber, Susan Ilene; Polonsky, Tamar; Belval, Brian J.; Shaklee, Patrick N.; Holme, Kevin
CS Univ. of Chicago, Section of Pediatric Infectious Diseases and Committee on Virology, Chicago, IL, 60637-1470, USA
SO Virology (1995), 206(2), 1108-16
CODEN: VIRLAX; ISSN: 0042-6822
PB Academic
DT Journal
LA English
CC 10-6 (Microbial, Algal, and Fungal Biochemistry)
AB Binding of **HSV-1** to cells is mediated by interactions of virion glycoproteins gC and/or gB with **heparan sulfate** (HS) glycosaminoglycans on cell surface proteoglycans. HS and the related glycosaminoglycan, heparin, comprise a family of heterogeneous carbohydrates composed of long, unbranched polysaccharides modified, for example, by sulfations and acetylations. To define the specific features of HS important for viral binding, we took advantage of the structural similarities between heparin and cell surface HS and compared the ability of chem. modified heparin compds. to inhibit the binding of viral particles to the cell surface and subsequent plaque formation. Because binding presumably involves multiple, complex interactions between known heparin-binding glycoproteins, gC and gB, and cell surface HS, we compared the effects of modified heparin compds. on the binding and subsequent plaque formation of wild-type and gC-neg. strains of **HSV-1** and, in select cases, the binding of gB-neg. virus to cells. We identified specific structural features of heparin essential for the inhibition of viral binding. For example, both N-sulfation and 6-O-sulfation must be important determinants since

desulfation of heparin at these sites abolished or decreased the antiviral activity of heparin. Moreover, we found that the antiviral activity of heparin was independent of its anticoagulant activity. Carboxyl-reduced and 2-,3-O desulfated heparin selectively inhibited binding of gC-pos. viruses (wild-type or a g-neg. strain) to cells, but had little or no inhibitory effect on binding and subsequent plaque formation for a gC-deletion virus. These results suggest that gC and gB interact with different structural features of HS.

ST **herpes** simplex virus binding heparin structure

IT Molecular structure-biological activity relationship
(**herpes** simplex virus-binding; of heparin)

IT **Sulfation**
(structural features of heparin required for inhibition of **herpes simplex virus type 1** binding in relation to)

IT Glycoproteins, specific or class
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(gB, structural features of heparin required for binding to **herpes simplex virus type 1** glycoprotein gB)

IT Glycoproteins, specific or class
RL: BPR (Biological process); BSU (Biological study, unclassified); BIOL (Biological study); PROC (Process)
(gC, structural features of heparin required for binding to **herpes simplex virus type 1** glycoprotein gC)

IT **Virus, animal**
(**herpes simplex 1**, structural features of heparin required for inhibition of **herpes simplex virus type 1** binding)

IT 9005-49-6, Heparin sulfate, biological studies
RL: BAC (Biological activity or effector, except adverse); BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(structural features of heparin required for inhibition of **herpes simplex virus type 1** binding)

L160 ANSWER 9 OF 11 HCAPLUS COPYRIGHT 2003 ACS

AN 1983:503433 HCAPLUS

DN 99:103433

TI Characterization of a **herpes** simplex virus type 2 75,000-molecular-weight glycoprotein antigenically related to **herpes simplex virus type 1** glycoprotein C

AU Zezulak, Kathleen M.; **Spear, Patricia G.**

CS Dep. Microbiol., Univ. Chicago, Chicago, IL, 60637, USA

SO Journal of Virology (**1983**), 47(3), 553-62
CODEN: JOVIAM; ISSN: 0022-538X

DT Journal

LA English

CC 15-2 (Immunochemistry)
Section cross-reference(s): 10

AB Evidence is presented that the **herpes** simplex virus type 2 glycoprotein previously designated gF is antigenically related to **herpes simplex virus type 1** glycoprotein (gC-1). An antiserum prepd. against type 1 virion envelope proteins immunopptd. gF of type 2 (gF-2), and competition expts. revealed that the anti-gC-1 component of the antiserum was responsible for the anti-gF-2 cross-reactivity. An antiserum prepd. against fully denatured purified gF-2, however, and 3 anti-gF-2 monoclonal antibodies failed to ppt. any type 1 antigen, indicating that the extent of cross-reactivity

between gC-1 and gF-2 may be limited. Several aspects of gF-2 synthesis and processing were investigated. Use of the enzymes endo-.beta.-N-acetylglucosaminidase H and .alpha.-**D**-N-acetylgalactosaminyl **oligosaccharidase** revealed that the fully processed form of gF-2 [about 75,000 (75K) apparent mol. wt.] had both complex-type N-linked and O-linked **oligosaccharides**, whereas newly synthesized forms (67K and 69K) had only high-mannose N-linked **oligosaccharides**. These last 2 forms were both reduced in size to 54K by treatment with endo-.beta.-N-acetylglucosaminidase H and therefore appear to differ only in the no. of N-linked chains. Neutralization tests and radioiodination expts. revealed that gF-2 is exposed on the surfaces of virions and that the 75K form of gF-2 is exposed on cell surfaces. The similarities and differences of gF-2 and gC-1 are discussed in light of recent mapping results which suggest collinearity of their resp. genes.

ST **herpes** virus glycoprotein antigenicity

IT Antigens
RL: BIOL (Biological study)
(**herpes** simplex virus glycoproteins C and F as, similarities of, of human)

IT Glycoproteins
RL: BIOL (Biological study)
(C, of **herpes simplex virus type** 1, type 2 glycoprotein F antigenic similarity to, of human)

IT Glycoproteins
RL: BIOL (Biological study)
(F, of **herpes** simplex virus type 2, formation of and type 2 glycoprotein F antigenic similarity to, of human)

IT **Virus, animal**
(**herpes simplex 1**, glycoprotein C of, type 2 glycoprotein F antigenic similarity to, of human)

IT Virus, animal
(**herpes** simplex 2, glycoprotein F of, type 1 glycoprotein C antigenic similarity to, of human)

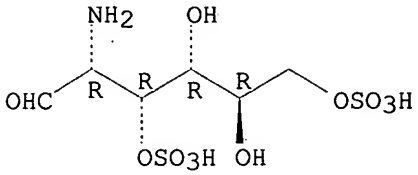
L160 ANSWER 10 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 1983:156693 HCAPLUS
DN 98:156693
TI O-linked **oligosaccharides** are acquired by **herpes** simplex virus glycoproteins in the Golgi apparatus
AU Johnson, David C.; **Spear, Patricia G.**
CS Dep. Microbiol., Univ. Chicago, Chicago, IL, 60637, USA
SO Cell (Cambridge, MA, United States) (**1983**), 32(3), 987-97
CODEN: CELLB5; ISSN: 0092-8674
DT Journal
LA English
CC 6-3 (General Biochemistry)
AB The O-linked **oligosaccharides** on mature forms of **herpes simplex virus type 1** (**HSV1**) glycoproteins were characterized and found to account largely for the lower electrophoretic mobilities of these forms relative to the mobilities of immature forms. Other posttranslational modifications of **HSV1** glycoproteins (designated gB, gC, **gD**, and gE) were related temporally to the discrete shifts in electrophoretic mobilities that signal acquisition of the O-linked **oligosaccharides**. Fatty acid acylation (principally of gE) could be detected just prior to the shifts, whereas conversion of high-mannose-type N-linked **oligosaccharides** to the complex type occurred coincident with the shifts. The addn. of O-linked **oligosaccharides** did not occur in cells treated with the ionophore monensin or in a ricin-resistant cell line defective in the processing of N-linked **oligosaccharides**. Evidently, extension of O-linked **oligosaccharide** chains on **HSV1** glycoproteins, and probably also attachment of the first O-linked sugars, occurs as a late posttranslational modification in the Golgi app.

ST glycoprotein **oligosaccharide herpes** simplex virus; Golgi app glycoprotein modification; fatty acid acylation glycoprotein
IT Fatty acids, biological studies
RL: BIOL (Biological study)
(glycoprotein of **herpes** simplex virus acylation by, O-linked **oligosaccharides** in relation to)
IT Golgi apparatus
(glycoproteins of **herpes** simplex virus processing by O-linked **oligosaccharides** in)
IT Glycoproteins
RL: PROC (Process)
(O-linked **oligosaccharide** processing of, of **herpes** simplex virus)
IT **Oligosaccharides**
RL: BIOL (Biological study)
(O-linked, glycoproteins of **herpes** simplex virus attachment of)
IT **Virus, animal**
(**herpes simplex 1**, glycoproteins of, O-linked **oligosaccharide** processing of)

L160 ANSWER 11 OF 11 HCAPLUS COPYRIGHT 2003 ACS
AN 1981:44880 HCAPLUS
DN 94:44880
TI Evidence for a 3-O-sulfated **D**-glucosamine residue in the antithrombin-binding sequence of heparin
AU Lindahl, Ulf; Baeckstroem, Gudrun; Thunberg, Lennart; Leder, Irwin G.
CS Biomed. Cent., Swed. Univ. Agric. Sci., Uppsala, S-751 23, Swed.
SO Proceedings of the National Academy of Sciences of the United States of America (**1980**), 77(11), 6551-5
CODEN: PNASA6; ISSN: 0027-8424
DT Journal
LA English
CC 13-5 (Mammalian Biochemistry)
Section cross-reference(s): 6
AB An octasaccharide with high affinity for antithrombin was isolated after partial deaminative cleavage of heparin with HNO2. After conversion of the 2,5-anhydro-**D**-mannose end group to anhydro[1-3H]mannitol, labeled pentasaccharide was released from the octasaccharide by periodate-alkali treatment. Incubation of the pentasaccharide with a 3-O-sulfatase from human urine resulted in desulfation, suggesting the occurrence of a 3-sulfate group on the terminal glucosamine residue. The same glucosamine residue was recovered as a 2,5-anhydro[1-3H]mannitol deriv. by a procedure involving deamination of the octasaccharide with HNO2, redn. of the products with NaB3H4, isolated of 3H-labeled tetrasaccharide by gel chromatog., and release of the labeled end group by periodate-alkali treatment. Paper electrophoresis indicated disulfated anhydro[3H]mannitol, presumably sulfated at C3 and C6, as a major component, along with smaller amts. of monosulfated (presumably 3-sulfated) anhydro[3H]mannitol. Similar treatment of an analogous tetrasaccharide derived from heparin with low affinity for antithrombin failed to produce any disulfated anhydromannitol. Evidently, 3-sulfated glucosamine is a unique component of high-affinity heparin, located at a specific position in the antithrombin-binding sequence of the mol.
ST antithrombin heparin binding glucosamine sulfate
IT 9005-49-6, biological studies
RL: BIOL (Biological study)
(antithrombin binding by, sulfated glucosamine residue in)
IT 9000-94-6
RL: BIOL (Biological study)
(heparin binding by, sulfated glucosamine residue in)
IT 76330-20-6 **76330-21-7**
RL: BIOL (Biological study)

(of heparin, antithrombin binding in relation to)
IT **76330-21-7**
RL: BIOL (Biological study)
(of heparin, antithrombin binding in relation to)
RN 76330-21-7 HCAPLUS
CN D-Glucose, 2-amino-2-deoxy-, 3,6-bis(hydrogen sulfate) (9CI) (CA INDEX NAME)

Absolute stereochemistry.



=> d all hitstr tot l155

L155 ANSWER 1 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1994:524657 HCAPLUS
DN 121:124657
TI Neomycin inhibits glycoprotein C (gC)-dependent binding of **herpes simplex virus type 1** to cells and also inhibits postbinding events in entry
AU Herold, Betsy C.; **Spear, Patricia G.**
CS Section of Pediatric Infectious Diseases, Univ. Chicago, Chicago, IL, 60637-1470, USA
SO Virology (**1994**), 203(1), 166-71
CODEN: VIRLAX; ISSN: 0042-6822
DT Journal
LA English
CC 1-5 (Pharmacology)
AB Previous studies have identified requirements for the binding of **herpes simplex virus type 1** (**HSV-1**) to cells, including the presence of particular glycoproteins in the virion envelope (gC or gB) and the presence of particular glycosaminoglycan chains (principally **heparan sulfate**) on cell surface proteoglycans. The authors show here that neomycin, a known inhibitor of **HSV** infection, blocked early events in **HSV** infection by two mechanisms: partial inhibition of the gC-dependent binding of virions, but not the gB-dependent binding, and inhibition of events that occurred after the binding of virus to cells. Near-maximal (but incomplete) inhibition of virus binding occurred at low concns. of neomycin (1 mM) for wild-type and gB-neg. virions only. Neomycin also inhibited the binding of isolated gC to cells at a similar concn. Concns. of neomycin as high as 50 mM had little or no effect on the binding of gC-neg. virions to cells. Nevertheless, neomycin significantly inhibited infection by both wild-type and gC-neg. virions, at concns. greater than 10 mM, indicating that the inhibition at higher doses was not due to effects on virus binding. The effects of neomycin on virus binding suggest that gC (but not gB) and neomycin compete for binding to similar structural features of cell surface **heparan sulfate**.
ST **herpes** virus glycoprotein C binding neomycin; virucide neomycin **herpes** glycoprotein binding cell
IT Virucides and Virustats
(neomycin, glycoprotein C-dependent binding of **herpes simplex virus type 1** to cells
inhibition by)

IT Glycoproteins, specific or class
RL: BIOL (Biological study)
(B, of **herpes simplex virus type 1**, cell binding dependent on, neomycin effect on)
IT Glycoproteins, specific or class
RL: BIOL (Biological study)
(gC, of **herpes simplex virus type 1**, cell binding dependent on, neomycin inhibition of)
IT **Virus, animal**
(**herpes simplex 1**, glycoprotein C-dependent binding of, to cells, neomycin inhibition of)
IT 1404-04-2, Neomycin
RL: BIOL (Biological study)
(glycoprotein C-dependent binding of **herpes simplex virus type 1** to cells inhibition by)

L155 ANSWER 2 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1994:432256 HCAPLUS
DN 121:32256
TI Glycoprotein C-independent binding of **herpes** simplex virus to cells requires cell surface **heparan sulfate** and glycoprotein B
AU Herold, Betsy C.; Visalli, Robert J.; Susmarski, Nanette; Brandt, Curtis R.; **Spear, Patricia G.**
CS Dep. Microbiol.-Immunol., Northwestern Univ. Med. Dental Schools, Chicago, IL, 60611, USA
SO Journal of General Virology (**1994**), 75(6), 1211-22
CODEN: JGVIAY; ISSN: 0022-1317
DT Journal
LA English
CC 14-3 (Mammalian Pathological Biochemistry)
AB Previous studies have shown that the initial interaction of **herpes** simplex virus (**HSV**) with cells is binding to **heparan sulfate** and that **HSV-1** glycoprotein C (gC) is principally responsible for this binding. Although gC-neg. viral mutants are impaired for binding and entry, they retain significant infectivity. The purpose of the studies reported here was to explore the requirements for infectivity of gC-neg. **HSV-1** mutants. The authors found that absence or alteration of cell surface **heparan sulfate** significantly reduced the binding of gC-neg. mutant virus and rendered cells resistant to infection, as shown previously for the wild-type virus. The authors isolated a recombinant double-mutated **HSV** strain that produces virions devoid of both of the known heparin-binding glycoproteins, gB and gC. The drastically impaired binding of these mutant virions to cells, relative to gC-neg. and wild-type virions, indicates that gB mediates the binding of gC-neg. virions to cells. Thus at least two **HSV** glycoproteins can independently mediate the binding of **HSV** to cell surface **heparan sulfate** to start the process of viral entry into cells.
ST glycoprotein C B **HSV** cell infection
IT Infection
(with **HSV-1**, cell surface **heparan sulfate** and glycoprotein B in binding of glycoprotein C-neg mutants in relation to)
IT Glycoproteins, specific or class
RL: BIOL (Biological study)
(B, **heparan sulfate** and, in **HSV-1** cell surface binding and infectivity)
IT Glycoproteins, specific or class
RL: BIOL (Biological study)
(C, infectivity of **HSV-1** mutants neg. for)

L155 ANSWER 3 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1994:103708 HCAPLUS
DN 120:103708
TI **Herpesvirus**-induced cell fusion that is dependent on cell surface **heparan sulfate** or soluble heparin
AU Shieh, Mei Tsu; **Spear, Patricia G.**
CS Med. Sch., Northwestern Univ., Chicago, IL, 60611, USA
SO Journal of Virology (**1994**), 68(2), 1224-8
CODEN: JOVIAM; ISSN: 0022-538X
DT Journal
LA English
CC 14-3 (Mammalian Pathological Biochemistry)
Section cross-reference(s): 10
AB The entry of enveloped viruses into animal cells and the cell-to-cell spread of infection via cell fusion require the membrane-fusing activity of viral glycoproteins. This activity can be dependent on variable cell factors or triggered by environmental factors. Here the authors show that cell fusion induced by **herpes** simplex virus glycoproteins is dependent on the presence of cell surface glycosaminoglycans, principally **heparan sulfate**, or on the addn. of heparin to the medium. The role of the glycosaminoglycan is probably to alter the conformation of a viral heparin-binding glycoprotein required for the fusion.
ST **herpesvirus** adhesion heparan glycosaminoglycan infection
IT Glycosaminoglycans, biological studies
RL: BIOL (Biological study)
(**HSV-1** fusion mediation by, of infected cell)
IT Infection
(by **HSV-1**, cell glycosaminoglycan mediation of binding of)
IT Adhesion
(bio-, of **HSV-1** to mammalian cells, glycosaminoglycan mediation of)
IT **Virus, animal**
(**herpes simplex 1**, cell glycosaminoglycan mediation of binding of)
IT 70226-44-7, Heparan
RL: BIOL (Biological study)
(**HSV-1** fusion to infected cells mediation by)

L155 ANSWER 4 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1993:512994 HCAPLUS
DN 119:112994
TI Entry of **alphaherpesviruses** into cells
AU **Spear, P. G.**
CS Med. Sch., Northwestern Univ., Chicago, IL, 60611, USA
SO Seminars in Virology (**1993**), 4(3), 167-80
CODEN: SEVIEL; ISSN: 1044-5773
DT Journal; General Review
LA English
CC 10-0 (Microbial, Algal, and Fungal Biochemistry)
Section cross-reference(s): 14
AB A review with 103 refs. Studies on four **alphaherpesviruses** (**herpes simplex virus types 1** and 2, pseudorabies virus and bovine **herpesvirus 1**) have revealed some common features of their entry into cells. The pathway of entry can be by fusion of the virion envelope with the cell plasma membrane. Receptors for binding and entry include **heparan sulfate** moieties of cell surface proteoglycans and other as yet unidentified cell surface components. Related glycoproteins specified by each of the four viruses mediate the binding of virus to **heparan sulfate** and subsequent mol. interactions leading to the penetration of virus into the cell.

ST **alphaherpesvirus** entry cell review
IT **Virus, animal**
(**herpes simplex 1**, infection with, cell entry mechanism of)
IT Virus, animal
(**herpes** simplex 2, infection with, cell entry mechanism of)
IT Virus, animal
(infectious bovine rhinotracheitis, infection with, cell entry mechanism of)
IT Virus, animal
(pseudorabies, infection with, cell entry mechanism of)

L155 ANSWER 5 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1993:210239 HCAPLUS
DN 118:210239
TI Cell surface receptors required for **herpes** simplex virus infection include **heparan sulfate** glycosaminoglycans
AU **Spear, Patricia G.**; Shieh, Mei Tsu; Herold, Betsy C.; WuDunn, Darrell
CS Med. Sch., Northwestern Univ., Chicago, IL, 60611, USA
SO Microb. Adhes. Invasion, [Proc. Symp.] (**1992**), Meeting Date 1990, 43-57. Editor(s): Hook, Magnus; Switalski, Lech. Publisher: Springer, New York, N. Y.
CODEN: 58SJAY
DT Conference; General Review
LA English
CC 14-0 (Mammalian Pathological Biochemistry)
Section cross-reference(s): 10
AB A review with 49 refs. There are a no. of viruses for which the only known specific interaction with the cell surface is binding to a carbohydrate moiety of a cell surface glycoprotein or glycolipid. In our view, **HSV** belongs in this category, at least for the present. The possibility exists, for any of these viruses, that the initial specific interaction with a carbohydrate leads to other specific interactions with proteins, lipids, etc. Because most of these viruses have broad host ranges, any specific receptors required must be highly conserved and broadly distributed. The interaction of **HSV** with **heparan sulfate** and heparin-like mols. could have functional significance in several ways. First, the binding of **HSV** to cell surface **heparan sulfate** serves to conc. virus on the cell surface. Second, inasmuch as many heparin-binding proteins are altered structurally and functionally by their interactions with heparin, the possibility exists that the binding of **HSV** glycoproteins to heparin sulfate activates functions required for viral penetration. Third, because both heparin and heparin-binding proteins can inhibit **HSV** infection and because structural tissue elements such as basement membranes are rich in **heparan sulfate** proteoglycans, the possibility exists that interactions of virus with any of these non-cell-assocd. mols. may serve to limit the spread of **HSV** infection, explaining perhaps the localized nature of most **HSV** infections.
ST **herpes** simplex virus cell receptor review; **heparan sulfate herpes** virus receptor review
IT Cell membrane
(**heparan sulfate** as **herpes** simplex virus receptor of)
IT Receptors
RL: BIOL (Biological study)
(**herpes** simplex virus, **heparan sulfate** as, for **herpes** simplex virus, in host cell surface)
IT **9050-30-0**
RL: BIOL (Biological study)
(as cell surface receptor for **herpes** simplex virus)

IT **9050-30-0**
RL: BIOL (Biological study)
(as cell surface receptor for **herpes** simplex virus)
RN 9050-30-0 HCAPLUS
CN Heparan, sulfate (9CI) (CA INDEX NAME)

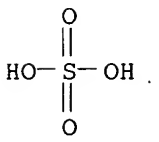
CM 1

CRN 70226-44-7
CMF Unspecified
CCI MAN

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CM 2

CRN 7664-93-9
CMF H2 O4 S



L155 ANSWER 6 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1993:166066 HCAPLUS
DN 118:166066
TI **Heparan sulfate** glycosaminoglycans as primary cell surface receptors for **herpes** simplex virus
AU **Spear, Patricia G.**; Shieh, Mei Tsu; Herold, Betsy C.; WuDunn, Darrell; Koshy, Thomas I.
CS Med. Sch., Northwestern Univ., Chicago, IL, 60611, USA
SO Advances in Experimental Medicine and Biology (**1992**), 313(Heparin Relat. Polysaccharides), 341-53
CODEN: AEMBAP; ISSN: 0065-2598
DT Journal; General Review
LA English
CC 14-0 (Mammalian Pathological Biochemistry)
AB A review, with 63 refs., which to summarizes the evidence that **heparan sulfate** moieties of proteoglycans serve as cell surface receptors for **herpes** simplex virus (**HSV**) and describes the heparin-binding viral glycoproteins that mediate the binding of virus to cells. These topics are discussed in the context of the mol. interactions required for entry of **HSV** into cells and, also, the pathol. of **HSV** infections.
ST review **heparan sulfate** glycosaminoglycan **herpes** virus
IT Glycosaminoglycans, biological studies
RL: BIOL (Biological study)
(heparitin sulfate-contg., as **herpes** simplex virus receptors, on human cell surfaces)
IT Virus, animal
(**herpes** simplex, receptors for, **heparan sulfate** glycosaminoglycans as, on human cell surfaces)
IT Receptors
RL: BIOL (Biological study)
(**herpes** simplex virus, **heparan sulfate** glycosaminoglycan as, on human cell surfaces)

L155 ANSWER 7 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1992:103565 HCAPLUS
DN 116:103565
TI Cell surface receptors for **herpes** simplex virus are **heparan sulfate** proteoglycans
AU Shieh, Mei Tsu; WuDunn, Darrell; Montgomery, Rebecca I.; Esko, Jeffrey D.; **Spear, Patricia G.**
CS Med. Sch., Northwestern Univ., Chicago, IL, 60611, USA
SO Journal of Cell Biology (**1992**), 116(5), 1273-81
CODEN: JCLBA3; ISSN: 0021-9525
DT Journal
LA English
CC 14-3 (Mammalian Pathological Biochemistry)
Section cross-reference(s): 10
AB The role of cell surface **heparan sulfate** in **herpes** simplex virus (**HSV**) infection was investigated using CHO cell mutants defective in various aspects of glycosaminoglycan synthesis. Binding of radiolabeled virus to the cells and infection were assessed in mutant and wild-type cells. Virus bound efficiently to wild-type cells and initiated an abortive infection in which immediate-early or .alpha. viral genes were expressed, despite limited prodn. of late viral proteins and progeny virus. Binding of virus to **heparan sulfate**-deficient mutant cells was severely impaired and mutant cells were resistant to **HSV** infection. Intermediate levels of binding and infection were obsd. for a CHO cell mutant that produced undersulfated **heparan sulfate**. These results show that **heparan sulfate** moieties of cell surface proteoglycans serve as receptors for **HSV**.
ST **herpes** simplex virus receptor **heparan sulfate**
IT Cell membrane
(**heparan sulfate** proteoglycans as **herpes** simplex virus receptors at surface of)
IT Proteoglycans, biological studies
RL: BIOL (Biological study)
(heparitin sulfate-contg., as **herpes** simplex virus receptors at cell surface)
IT Virus, animal
(**herpes** simplex, receptors for, **heparan sulfate** proteoglycans of cell surface as)
IT Receptors
RL: BIOL (Biological study)
(**herpes** simplex virus, **heparan sulfate** proteoglycans of cell surface as)
IT **9050-30-0, Heparan sulfate**
RL: BIOL (Biological study)
(as **herpes** simplex virus receptors at cell surface)
IT **9050-30-0, Heparan sulfate**
RL: BIOL (Biological study)
(as **herpes** simplex virus receptors at cell surface)
RN 9050-30-0 HCAPLUS
CN Heparan, sulfate (9CI) (CA INDEX NAME)

CM 1

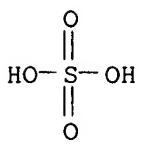
CRN 70226-44-7
CMF Unspecified
CCI MAN

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CM 2

CRN 7664-93-9

CMF H2 O4 S



L155 ANSWER 8 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1991:118396 HCAPLUS
DN 114:118396
TI Glycoprotein C of **herpes simplex virus type 1** plays a principal role in the adsorption of virus to cells and in infectivity
AU Herold, Betsy C.; WuDunn, Darrell; Soltys, Nanette; **Spear, Patricia G.**
CS Med. Sch., Northwestern Univ., Chicago, IL, 60611, USA
SO Journal of Virology (**1991**), 65(3), 1090-8
CODEN: JOVIAM; ISSN: 0022-538X
DT Journal
LA English
CC 10-6 (Microbial Biochemistry)
AB The **herpes** simplex virus glycoprotein that mediates the adsorption of virions to cells was identified. Because **heparan sulfate** moieties of cell surface proteoglycans serve as the receptors for **herpes** simplex virus adsorption, viral glycoprotein binding to heparin-Sepharose was studied in affinity chromatog. expts. Two glycoproteins, gB and gC, bound to heparin-Sepharose and could be eluted with sol. heparin. In order to det. whether virions devoid of gC or gB were impaired for adsorption, the binding of wild-type and mutant virions to cells was quantitated. At equiv. input concns. of purified virions, significantly fewer gC-neg. virions bound to cells than did wild-type or gB-neg. virions. In addn., the gC-neg. virions that bound to cells showed a significant delay in penetration compared with wild-type virus. The impairments in adsorption and penetration of the gC-neg. virions can account for their reduced PFU/particle ratios, which were 5-10% that of wild-type virions, depending on the host cell. Although gC is dispensable for replication of **herpes** simplex in cell culture, it clearly facilitates virion adsorption and enhances infectivity by about a factor of 10.
ST glycoprotein C **herpes** simplex virus adsorption
IT Microbial virulence
(of **herpes simplex virus type 1**, glycoprotein C in)
IT Adsorption
(of **herpes simplex virus type 1**, to host cells, glycoprotein C in)
IT Glycoproteins, specific or class
RL: BIOL (Biological study)
(gC, of **herpes simplex virus 1**, in adsorption and infectivity of virus)
IT **Virus, animal**
(**herpes simplex 1**, glycoprotein C of, in adsorption of virus to cells and infectivity)

L155 ANSWER 9 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1989:55215 HCAPLUS
DN 110:55215
TI Initial interaction of **herpes** simplex virus with cells is binding to **heparan sulfate**

AU WuDunn, Darrell; **Spear, Patricia G.**
CS Dep. Mol. Genet. Cell Biol., Univ. Chicago, Chicago, IL, 60637, USA
SO Journal of Virology (**1989**), 63(1), 52-8
CODEN: JOVIAM; ISSN: 0022-538X
DT Journal
LA English
CC 14-3 (Mammalian Pathological Biochemistry)
Section cross-reference(s): 10
AB It was shown that cell surface **heparan sulfate** serves as the initial receptor for both serotypes of **herpes** simplex virus (**HSV**). It was also found that virions could bind to heparin, a related glycosaminoglycan, and that heparin blocked virus adsorption. Agents known to bind to cell surface **heparan sulfate** blocked viral adsorption and infection. Enzymic digestion of cell surface **heparan sulfate** but not of dermatan sulfate or chondroitin sulfate concomitantly reduced the binding of virus to the cells and rendered the cells resistant to infection. Although cell surface **heparan sulfate** was required for infection by **HSV** types 1 and 2, the two serotypes may bind to **heparan sulfate** with different affinities or may recognize different structural features of **heparan sulfate**. Consistent with their broad host ranges, the two **HSV** serotypes use as primary receptors ubiquitous cell surface components known to participate in interactions with the extracellular matrix and with other cell surfaces.
ST **heparan sulfate** host **herpes** virus receptor
IT Receptors
RL: BIOL (Biological study)
(for **herpes** simplex virus, **heparan sulfate** of host cell surface as)
IT Cell membrane
(**heparan sulfate** of, of host cell as **herpes** simplex virus receptor)
IT **Virus, animal**
(**herpes simplex 1, heparan sulfate** of host cell surface as receptor for)
IT Virus, animal
(**herpes** simplex 2, **heparan sulfate** of host cell surface as receptor for)
IT **9050-30-0, Heparan sulfate**
RL: BIOL (Biological study)
(of animal cell membrane, as **herpes** simplex virus receptor)
IT **9050-30-0, Heparan sulfate**
RL: BIOL (Biological study)
(of animal cell membrane, as **herpes** simplex virus receptor)
RN 9050-30-0 HCAPLUS
CN Heparan, sulfate (9CI) (CA INDEX NAME)

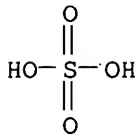
CM 1

CRN 70226-44-7
CMF Unspecified
CCI MAN

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CM 2

CRN 7664-93-9
CMF H2 O4 S



L155 ANSWER 10 OF 10 HCAPLUS COPYRIGHT 2003 ACS
AN 1986:605876 HCAPLUS
DN 105:205876
TI Oligomerization of **herpes** simplex virus glycoprotein B
AU Claesson-Welsh, L.; **Spear, Patricia G.**
CS Dep. Mol. Genet. Cell Biol. Committee Virol., Univ. Chicago, Chicago, IL, 60637, USA
SO Journal of Virology (**1986**), 60(2), 803-6
CODEN: JOVIAM; ISSN: 0022-538X
DT Journal
LA English
CC 10-1 (Microbial Biochemistry)
AB Glycoprotein B (gB) specified by **herpes** simplex virus was extd. from virions or infected cells in the form of detergent-stable, heat-dissociable oligomers. The compn. of the oligomers and requirements for their formation were investigated. The faster-migrating forms of the oligomers are homodimers of gB. Dimerization occurred within minutes of polypeptide synthesis and did not depend on glycosylation, the expression of other viral proteins, or virion morphogenesis. The multiple, electrophoretically distinct forms of gB dimers differed in extent or rate of N-linked **oligosaccharide** processing and also had other differences that influence electrophoretic mobility.
ST **herpes** simplex virus glycoprotein B oligomerization
IT **Oligosaccharides**
RL: PROC (Process)
(of **herpes** simplex virus glycoprotein B oligomers, variable processing of)
IT Glycoproteins
RL: RCT (Reactant); RACT (Reactant or reagent)
(gB, oligomerization of, of **herpes** simplex virus)
IT Virus, animal
(**herpes** simplex, glycoprotein B of, oligomerization of)
IT Polymerization
(oligomerization, of glycoprotein B of **herpes** simplex virus)

=> sel hit rn l160
E1 THROUGH E4 ASSIGNED

=> fil reg
FILE 'REGISTRY' ENTERED AT 16:50:00 ON 06 JUL 2003
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

STRUCTURE FILE UPDATES: 4 JUL 2003 HIGHEST RN 542812-68-0
DICTIONARY FILE UPDATES: 4 JUL 2003 HIGHEST RN 542812-68-0

TSCA INFORMATION NOW CURRENT THROUGH JANUARY 6, 2003

Please note that search-term pricing does apply when

conducting SmartSELECT searches.

Crossover limits have been increased. See HELP CROSSOVER for details.

Experimental and calculated property data are now available. See HELP PROPERTIES for more information. See STNote 27, Searching Properties in the CAS Registry File, for complete details:
http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf

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=> s e1-e4
             1 9050-30-0/BI
               (9050-30-0/RN)
             1 183257-54-7/BI
               (183257-54-7/RN)
             1 328085-46-7/BI
               (328085-46-7/RN)
             1 76330-21-7/BI
               (76330-21-7/RN)
L161         4 (9050-30-0/BI OR 183257-54-7/BI OR 328085-46-7/BI OR 76330-21-7/
               BI)

=> d ide can tot

L161 ANSWER 1 OF 4  REGISTRY  COPYRIGHT 2003 ACS
RN   328085-46-7  REGISTRY
CN   D-Glucose, 2-amino-2-deoxy-4-O-(2-O-sulfo-.beta.-L-idopyranuronosyl)-,
     3,6-bis(hydrogen sulfate) (9CI)  (CA INDEX NAME)
FS   STEREOSEARCH
MF   C12 H21 N O20 S3
SR   CA
LC   STN Files:   CA, CAPLUS

Absolute stereochemistry.
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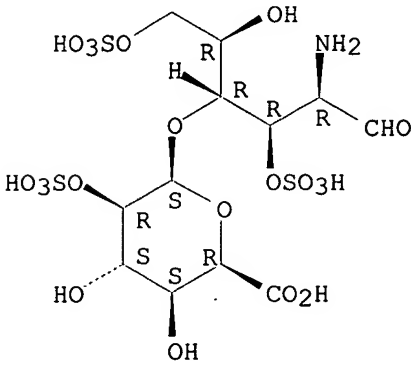


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**PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT**

               1 REFERENCES IN FILE CA (1957 TO DATE)
               1 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
               1 REFERENCES IN FILE CAPLUS (1957 TO DATE)

REFERENCE   1:  134:212717

L161 ANSWER 2 OF 4  REGISTRY  COPYRIGHT 2003 ACS
RN   183257-54-7  REGISTRY
CN   Sulfotransferase, heparitin 3- (9CI)  (CA INDEX NAME)
OTHER NAMES:
CN   E.C. 2.8.2.23
```

CN Heparan sulfate 3-O-sulfotransferase
CN Heparan sulfate 3-sulfotransferase
CN Heparan sulfate D-glucosaminyl 3-O-sulfotransferase
CN Heparitin 3-sulfotransferase
MF Unspecified
CI MAN
SR CA
LC STN Files: BIOSIS, CA, CAPLUS, TOXCENTER

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
28 REFERENCES IN FILE CA (1957 TO DATE)
28 REFERENCES IN FILE CAPLUS (1957 TO DATE)

REFERENCE 1: 138:366987

REFERENCE 2: 138:335272

REFERENCE 3: 138:300153

REFERENCE 4: 138:217216

REFERENCE 5: 138:102854

REFERENCE 6: 137:380005

REFERENCE 7: 137:346197

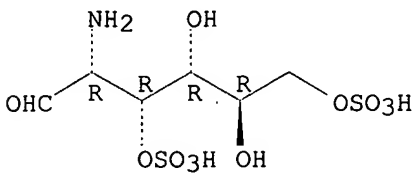
REFERENCE 8: 137:346196

REFERENCE 9: 137:306632

REFERENCE 10: 137:243160

L161 ANSWER 3 OF 4 REGISTRY COPYRIGHT 2003 ACS
RN **76330-21-7** REGISTRY
CN D-Glucose, 2-amino-2-deoxy-, 3,6-bis(hydrogen sulfate) (9CI) (CA INDEX NAME)
FS STEREOSEARCH
MF C6 H13 N O11 S2
CI COM
LC STN Files: CA, CAPLUS, TOXCENTER

Absolute stereochemistry.



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

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5 REFERENCES IN FILE CAPLUS (1957 TO DATE)

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REFERENCE 2: 138:198609

REFERENCE 3: 137:299942

REFERENCE 4: 134:212717

REFERENCE 5: 94:44880

L161 ANSWER 4 OF 4 REGISTRY COPYRIGHT 2003 ACS
RN **9050-30-0** REGISTRY
CN Heparan, sulfate (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN Heparitin sulfate (8CI)
OTHER NAMES:
CN Alpha-Idosane
CN Heparan N-sulfate
CN Heparan sulphate
CN Heparatan sulfate
CN Heparitin
CN Heparitin monosulfate
CN HHS 5
CN N-Acetylheparan sulfate
CN Suleparoid
CN Tavidan
DR 12751-16-5, 11078-25-4, 11097-05-5, 11129-40-1, 29188-70-3
MF H2 O4 S . x Unspecified
CI COM
LC STN Files: ADISNEWS, AGRICOLA, ANABSTR, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CABA, CANCERLIT, CAPLUS, CASREACT, CHEMCATS, CHEMLIST, CIN, CSCHEM, DDFU, DRUGU, DRUGUPDATES, EMBASE, IPA, MEDLINE, PROMT, RTECS*, TOXCENTER, USPAT2, USPATFULL
(*File contains numerically searchable property data)
Other Sources: EINECS**
(**Enter CHEMLIST File for up-to-date regulatory information)

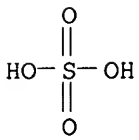
CM 1

CRN 70226-44-7
CMF Unspecified
CCI MAN

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CM 2

CRN 7664-93-9
CMF H2 O4 S



4242 REFERENCES IN FILE CA (1957 TO DATE)
244 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
4250 REFERENCES IN FILE CAPLUS (1957 TO DATE)

REFERENCE 1: 139:26657

REFERENCE 2: 139:19986

REFERENCE 3: 139:19731

REFERENCE 4: 139:17099

REFERENCE 5: 139:5397

REFERENCE 6: 139:4604

REFERENCE 7: 139:4186

REFERENCE 8: 139:4177

REFERENCE 9: 139:4171

REFERENCE 10: 138:399059

=> d his

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               SET COST OFF

     FILE 'HCAPLUS' ENTERED AT 14:58:22 ON 06 JUL 2003
               E WO2000-US23288/AP,PRN
L1           1 S E3
               E US99-150743/AP,PRN
L2           1 S E5
               E US2000-175347/AP,PRN
L3           1 S E5
L4           1 S L1-L3
               E SHUKLA D/AU
L5         168 S E3-E12,E15,E16
               E ROSENBURG R/AU
L6           2 S E3,E4
               E ROSENBERG R/AU
L7         402 S E3,E8,E34,E40
               E SPEAR P/AU
L8         142 S E3,E6,E9,E10
L9           1 S L4 AND L5-L8
               SEL RN

     FILE 'REGISTRY' ENTERED AT 15:02:48 ON 06 JUL 2003
L10         14 S E1-E14
L11          6 S 67-68-5 OR 57-55-6 OR 67-63-0 OR 64-17-5 OR 112-80-1 OR 872-5
L12          1 S 9050-30-0
L13         14 S (70226-44-7 AND 7664-93-9)/CRN
L14          3 S L13 AND (CA OR NA OR K)/ELS AND 3/NC
L15          4 S L12,L14
L16          7 S L10 NOT L11-L15
L17          3 S L16 AND SQL/FA
L18          4 S L16 NOT L17
L19          1 S L18 AND UNSPECIFIED
L20          3 S L18 NOT L19

     FILE 'HCAPLUS' ENTERED AT 15:11:23 ON 06 JUL 2003
L21        703 S L5-L8 NOT L9

     FILE 'HCAPLUS' ENTERED AT 15:11:31 ON 06 JUL 2003
               SET SMARTSELECT ON
L22        SEL L21 1- RN :    1245 TERMS
               SET SMARTSELECT OFF

     FILE 'HCAPLUS' ENTERED AT 15:12:08 ON 06 JUL 2003
L24        703 S L21 OR L21
               SEL AN L24 1-200
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L25          200 S E15-E406
                 SEL AN L24 201-400
L26          200 S E407-E803
                 DEL SEL
                 SEL AN L24 401-600
L27          200 S E1-E400
                 SEL AN L24 601-703
L28          103 S E401-E606

     FILE 'REGISTRY' ENTERED AT 15:15:14 ON 06 JUL 2003

     FILE 'HCAPLUS' ENTERED AT 15:15:14 ON 06 JUL 2003
                 SET SMARTSELECT ON
L29           SEL L25 1- RN :     751 TERMS
                 SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 15:15:16 ON 06 JUL 2003
L30           751 S L29

     FILE 'HCAPLUS' ENTERED AT 15:15:29 ON 06 JUL 2003
                 SET SMARTSELECT ON
L31           SEL L26 1- RN :     321 TERMS
                 SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 15:15:31 ON 06 JUL 2003
L32           322 S L31

     FILE 'HCAPLUS' ENTERED AT 15:15:40 ON 06 JUL 2003
                 SET SMARTSELECT ON
L33           SEL L27 1- RN :     246 TERMS
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     FILE 'REGISTRY' ENTERED AT 15:15:41 ON 06 JUL 2003
L34           246 S L33

     FILE 'HCAPLUS' ENTERED AT 15:15:49 ON 06 JUL 2003
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L35           SEL L28 1- RN :     108 TERMS
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     FILE 'REGISTRY' ENTERED AT 15:15:50 ON 06 JUL 2003
L36           108 S L35
L37          1245 S L30,L32,L34,L36
L38          1241 S L37 NOT L10
L39            58 S L38 AND OC5/ES
L40           188 S L38 AND S/ELS
L41           333 S L38 AND UNSPECIFIED
L42           144 S L41 NOT SQL/FA
L43             8 S L42 AND SULFOTRANSFERASE
L44             1 S L43 AND 3
L45           184 S L40 NOT L41
L46            54 S L45 AND L39
L47            14 S L46 NOT SULFOAMINO
L48             1 S L47 AND C12H21NO14S
L49           130 S L45 NOT L46
L50            96 S L49 NOT SQL/FA
L51             4 S L39 NOT L46-L50
L52             5 S L38 AND ?GLUC?/CNS NOT L39-L51
L53             1 S L20 AND OC5/ES
L54               STR
L55             0 S L54
L56               STR L54
L57             0 S L56
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L58             STR L56
L59           0 S L58
L60          16 S L58 FUL
                SAV L60 MAIER069/A
L61           1 S L60 AND C12H21NO20S3
                SAV L61 MAIER069A/A
                E C6H13NO11S2/MF
L62           9 S E3
L63           3 S L62 NOT SULFOAMINO
L64           2 S L63 NOT IDS/CI
L65           1 S L64 AND 3
L66             STR L58
L67           9 S L66
L68         224 S L66 FUL
                SAV L68 MAIER069B/A
L69             STR L66
L70           0 S L69 SAM SUB=L68
L71           4 S L69 FUL SUB=L68
                SAV L71 MAIER069C/A
L72             STR L69
L73          30 S L72 FUL SUB=L68
                SAV L73 MAIER069D/A
L74          26 S L73 NOT L71,L65
L75           1 S L74 AND C12H21NO20S3

     FILE 'HCAPLUS' ENTERED AT 16:04:08 ON 06 JUL 2003
L76           5 S L61,L65,L75
L77           2 S L76 AND (PY<=1999 OR PRY<=1999 OR AY<=1999)
L78          19 S 3 OST
L79          67 S 3 O ()(SULFOTRANSFERASE OR SULPHOTRANSFERASE OR (SULFO OR SUL
L80          70 S L78,L79
L81           5 S L80 (L) 3A
L82           4 S L80 (L) 3B
L83           7 S L81,L82
L84          21 S L80 AND L12
L85          40 S L80 AND HEPARAN()(SULFATE OR SULPHATE)
L86          40 S L84,L85
L87           4 S 3OST#
L88          42 S L83,L86,L87
L89          42 S L80 AND L88
L90          28 S L80 NOT L89
L91           1 S L90 AND HERPES SIMPLEX
                SEL RN L89
                DEL SEL

     FILE 'REGISTRY' ENTERED AT 16:12:03 ON 06 JUL 2003

     FILE 'HCAPLUS' ENTERED AT 16:12:03 ON 06 JUL 2003
                SET SMARTSELECT ON
L92          SEL L89 1- RN :    4962 TERMS
                SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 16:12:06 ON 06 JUL 2003
L93        4962 S L92
L94          63 S L93 AND (?SULFOTRANSFERASE? OR ?SULPHOTRANSFERASE?)/CNS
L95          61 S L94 AND (SULFOTRANSFERASE OR SULPHOTRANSFERASE)/INS.HP
L96           2 S L94 NOT L95
L97          47 S L95 AND 3
L98          13 S L95 AND (3A OR 3B)
L99          47 S L97,L98
L100         14 S L95 NOT L99
L101         41 S L99 AND (3 OR 3A OR 3B)/INS.HP
L102          6 S L99 NOT L101
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L103          2 S L102 NOT (SQL/FA OR STEROID)
L104         38 S L101 AND HEPAR?
L105          3 S L101 NOT L104
L106          2 S L105 AND 3 O
L107         19 S L104 AND 3 O
L108          1 S L107 NOT (CLONE OR MUS OR MOUSE)
L109         19 S L104 NOT L107
L110          2 S L19,L103
L111        909 S SULFOTRANSFERASE OR SULPHOTRANSFERASE
L112        846 S L111 NOT L94
L113        136 S L112 AND 3
L114         13 S L112 AND 3 O
L115        123 S L113 NOT L114
L116          0 S L112 AND (3A OR 3B)

     FILE 'HCAPLUS' ENTERED AT 16:22:51 ON 06 JUL 2003
L117         34 S L110
L118         31 S L117 AND L78-L90
L120         15 S HEPARAN()(SULFATE OR SULPHATE)()(3 OR 3 O)()(SULFOTRANSFERASE
L121         73 S L78-L90,L117-L120
L122          6 S L121 AND ?HERPE?
                E HERPES/CT
                E E31+ALL
L123       2969 S E2
                E E2+ALL
L124       4254 S E8
L125          9 S E6
                E E6+ALL
L126       7223 S E9,E12
                E E9+ALL
L127      10903 S E7,E9-E26/BI
L128       4250 S L12
L129       7432 S HEPARAN()(SULFATE OR SULPHATE)
L130      11444 S L123-L127
L131         39 S L130 AND L128
L132         82 S L130 AND L129
L133          1 S L77 AND L121
L134          1 S L77 AND L130
L135          2 S L77,L133,L134
                E GLYCOPROTEIN/CT
L136        691 S E186,E187
L137       1024 S (GLYCOPROTEIN OR GP)(L)GD
L138          3 S L136,L137 AND L121
L139        672 S L136,L137 AND L130
L140        926 S L136,L137 AND (?HERPE? OR HSV?)
L141        708 S L139,L140 AND (PY<=1999 OR PRY<=1999 OR AY<=1999)
L142          0 S L141 AND (OVERSULFAT? OR OVERSULPHAT?)
                E SULFATION/CT
                E E3+ALL
L143          1 S L141 AND E3
L144         28 S L141 AND ?SACCHARIDE?
L145        130 S L5-L8 AND (?HERPE? OR HSV? OR L123-L127)
L146          6 S L145 AND ?SACCHARID?
L147         15 S L145 AND L128,L129
L148          4 S L145 AND L121
L149         19 S L146-L148
L150         15 S L149 AND (PY<=1999 OR PRY<=1999 OR AY<=1999)
L151          4 S L149 NOT L150
L152         20 S L150,L151,L135
L153        111 S L145 NOT L152
L154         10 S L152 AND (D OR GD)
L155         10 S L152 NOT L154
L156        163 S L129,L128 AND E3+NT
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L157          2 S L156 AND L123-L127
L158          2 S L156 AND (?HERPE? OR HSV?)
L159          2 S L157,L158
L160         11 S L159,L154

     FILE 'REGISTRY' ENTERED AT 16:47:23 ON 06 JUL 2003

     FILE 'HCAPLUS' ENTERED AT 16:48:24 ON 06 JUL 2003
               SEL HIT RN L160

     FILE 'REGISTRY' ENTERED AT 16:50:00 ON 06 JUL 2003
L161          4 S E1-E4

=> fil biosis
FILE 'BIOSIS' ENTERED AT 17:05:28 ON 06 JUL 2003
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FILE COVERS 1969 TO DATE.
CAS REGISTRY NUMBERS AND CHEMICAL NAMES (CNs) PRESENT
FROM JANUARY 1969 TO DATE.

RECORDS LAST ADDED: 2 July 2003 (20030702/ED)


=> d all tot

L190 ANSWER 1 OF 8  BIOSIS  COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.
AN   2001:514668  BIOSIS
DN   PREV200100514668
TI   Portable sulphotransferase domain determines sequence
     specificity of heparan sulphate 3-O
     -sulphotransferases.
AU   Yabe, Tomio; Shukla, Deepak; Spear, Patricia G.;
     Rosenberg, Robert D.; Seeberger, Peter H.; Shworak, Nicholas W.
     (1)
CS   (1) Department of Medicine, Angiogenesis Research Center,
     Dartmouth-Hitchcock Medical Center, One Medical Center Drive, HB7504,
     Lebanon, NH, 03756: nicholas.shworak@dartmouth.edu USA
SO   Biochemical Journal, (1 October, 2001) Vol. 359, No. 1, pp. 235-241.
     print.
     ISSN: 0264-6021.
DT   Article
LA   English
SL   English
AB   3-O-Sulphates are the rarest substituent of heparan
     sulphate and are therefore ideally suited to the selective
     regulation of biological activities. Individual isoforms of
     heparan sulphate D-glucosaminyl 3-
     O-sulphotransferase (3-OST) exhibit
     sequence-specific action, which creates heparan sulphate
     structures with distinct biological functions. For example, 3-
     OST-1 preferentially generates binding sites for anti-thrombin,
     whereas 3-OST-3 isoforms create binding sites for the
     gD envelope protein of herpes simplex virus 1
     (HSV-1), which enables viral entry. 3-OST
     enzymes comprise a presumptive sulphotransferase domain and a
     divergent N-terminal region. To localize determinants of sequence
     specificity, we conducted domain swaps between cDNA species. The
     N-terminal region of 3-OST-1 was fused with the
     sulphotransferase domain of 3-OST-3A
     to generate N1-ST3A. Similarly, the N-terminal region of 3-
     OST-3A was fused to the sulphotransferase
     domain of 3-OST-1 to generate N3A-ST1. Wild-type and
```

chimaeric enzymes were transiently expressed in COS-7 cells and extracts were analysed for selective generation of binding sites for anti-thrombin. **3-OST**-1 was 270-fold more efficient at forming anti-thrombin-binding sites than **3-OST-3A**, indicating its significantly greater selectivity for substrates that can be 3-O-sulphated to yield such sites. N3A-ST1 was as active as **3-OST**-1, whereas the activity of N1-ST3A was as low as that of **3-OST-3A**. Analysis of Chinese hamster ovary cell transfectants revealed that only **3-OST-3A** and N1-ST3A generated **gD**-binding sites and conveyed susceptibility to infection by **HSV**-1. Thus sequence-specific properties of **3-OSTs** are defined by a self-contained **sulphotransferase** domain and are not directly influenced by the divergent N-terminal region.

CC Cytology and Cytochemistry - Animal *02506
Biochemical Studies - Carbohydrates *10068
Enzymes - General and Comparative Studies; Coenzymes *10802
Virology - Animal Host Viruses *33506

BC **Herpesviridae 02612**
Cercopithecidae 86205
Cricetidae 86310

IT Major Concepts
Enzymology (Biochemistry and Molecular Biophysics)

IT Chemicals & Biochemicals
3-O-**sulfates**; **3-O-sulfotransferase**-1: amino-terminal domain, domain swapping, expression, **sulfotransferase** domain; **3-O-sulfotransferase**-3-A: amino-terminal domain, domain swapping, expression, **sulfotransferase** domain; anti-coagulant; anti-thrombin; **gD** viral **glycoprotein**; **heparan sulfate**; **heparan sulphate** **3-O-sulphotransferases**: expression, portable **sulphotransferase** domain, sequence specificity

ORGN Super Taxa
Cercopithecidae: Primates, Mammalia, Vertebrata, Chordata, Animalia; Cricetidae: Rodentia, Mammalia, Vertebrata, Chordata, Animalia; **Herpesviridae: Animal Viruses, Viruses, Microorganisms**

ORGN Organism Name
CHO cell line (Cricetidae): Chinese hamster ovary cells; COS-7 cell line (Cercopithecidae); **herpes simplex virus (Herpesviridae)**

ORGN Organism Superterms
Animal Viruses; Animals; Chordates; Mammals; Microorganisms; Nonhuman Mammals; Nonhuman Primates; Nonhuman Vertebrates; Primates; Rodents; Vertebrates; Viruses

RN 9000-94-6 (ANTI-THROMBIN)
9050-30-0 (HEPARAN SULFATE)

L190 ANSWER 2 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.
AN **2001:455646** BIOSIS
DN **PREV200100455646**
TI **Herpesviruses** and **heparan sulfate**: An intimate relationship in aid of viral entry.
AU **Shukla, Deepak; Spear, Patricia G. (1)**
CS (1) Department of Microbiology-Immunology, Northwestern University Medical School, 320 East Superior Street, Chicago, IL, 60611: p-spear@northwestern.edu USA
SO Journal of Clinical Investigation, (August, 2001) Vol. 108, No. 4, pp. 503-510. print.
ISSN: 0021-9738.
DT General Review
LA English
SL English
CC Cytology and Cytochemistry - General *02502

Cytology and Cytochemistry - Human *02508
Biochemical Studies - General *10060
Biochemical Studies - Carbohydrates *10068
Virology - Animal Host Viruses *33506
Medical and Clinical Microbiology - Virology *36006
BC **Herpesviridae 02612**
Hominidae 86215
IT Major Concepts
Biochemistry and Molecular Biophysics; Cell Biology; Infection
IT Diseases
herpesvirus infection: clinical manifestations, pathogenesis, viral disease
IT Chemicals & Biochemicals
heparan sulfate: viral entry receptor;
herpesvirus glycoproteins: molecular interactions
IT Alternate Indexing
Herpesviridae Infections (MeSH)
IT Miscellaneous Descriptors
viral entry
ORGN Super Taxa
Herpesviridae: Animal Viruses, Viruses, Microorganisms;
Hominidae: Primates, Mammalia, Vertebrata, Chordata, Animalia
ORGN Organism Name
herpesviruses (Herpesviridae): pathogen; human (Hominidae): host
ORGN Organism Superterms
Animal Viruses; Animals; Chordates; Humans; Mammals; Microorganisms; Primates; Vertebrates; Viruses
RN **9050-30-0 (HEPARAN SULFATE)**

L190 ANSWER 3 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.
AN **2001:84370** BIOSIS
DN **PREV200100084370**
TI Cell fusion induced by **herpes simplex** virus **glycoproteins** gB, **gD**, and gH-gL requires a **gD** receptor but not necessarily **heparan sulfate**.
AU Pertel, Peter E.; Fridberg, Alina; Parish, Mary L.; **Spear, Patricia G. (1)**
CS (1) Department of Microbiology-Immunology, Northwestern University Medical School, 320 East Superior Street, Room Ward 6-241, Chicago, IL, 60611: p-spear@northwestern.edu USA
SO Virology, (January 5, 2001) Vol. 279, No. 1, pp. 313-324. print.
ISSN: 0042-6822.
DT Article
LA English
SL English
AB To characterize cellular factors required for **herpes simplex** virus type 1 (**HSV**-1)-induced cell fusion, we used an efficient and quantitative assay relying on expression of **HSV**-1 **glycoproteins** in transfected cells. We showed the following: (1) Cell fusion depended not only on expression of four viral **glycoproteins** (gB, **gD**, and gH-gL), as previously shown, but also on expression of cell surface entry receptors specific for **gD**. (2) Cell fusion required expression of all four **glycoproteins** in the same cell. (3) **Heparan sulfate** was not required for cell fusion. (4) Coexpression of receptor with the four **glycoproteins** in the same cell reduced fusion activity, indicating that interaction of **gD** and receptor can limit polykaryocyte formation. Overall, the viral and cellular determinants of **HSV**-1-induced cell fusion are similar to those for viral entry, except that **HSV**-1 entry is significantly enhanced by binding of virus to cell surface **heparan sulfate**.

CC Biochemical Studies - Carbohydrates *10068
Cytology and Cytochemistry - Animal *02506
Biochemical Studies - Proteins, Peptides and Amino Acids *10064
Biophysics - Membrane Phenomena *10508
Virology - Animal Host Viruses *33506
Medical and Clinical Microbiology - Virology *36006
BC **Herpesviridae 02612**
Cricetidae 86310
IT Major Concepts
Membranes (Cell Biology); Infection
IT Chemicals & Biochemicals
gB: **glycoprotein**; **gD: glycoprotein**;
gD receptor; gH-gL: **glycoprotein**; **heparan sulfate**: **gD** receptor
IT Miscellaneous Descriptors
cell fusion
ORGN Super Taxa
Cricetidae: Rodentia, Mammalia, Vertebrata, Chordata, Animalia;
Herpesviridae: Animal Viruses, Viruses, Microorganisms
ORGN Organism Name
CHO-745 cell line (Cricetidae); CHO-K1 cell line (Cricetidae);
herpes simplex virus type 1 [HSV-1] (Herpesviridae): pathogen
ORGN Organism Superterms
Animal Viruses; Animals; Chordates; Mammals; Microorganisms; Nonhuman Mammals; Nonhuman Vertebrates; Rodents; Vertebrates; Viruses
RN **9050-30-0 (HEPARAN SULFATE)**

L190 ANSWER 4 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.
AN 1999:530618 BIOSIS
DN PREV199900530618
TI A novel role for 3-O-sulfated **heparan sulfate** in **herpes simplex** virus 1 entry.
AU **Shukla, Deepak**; Liu, Jian; Blaiklock, Peter; Shworak, Nicholas W.; Bai, Xiaomei; Esko, Jeffrey D.; Cohen, Gary H.; Eisenberg, Roselyn J.; **Rosenberg, Robert D.**; **Spear, Patricia G. (1)**
CS (1) Department of Microbiology-Immunology, Northwestern University Medical School, Chicago, IL, 60611 USA
SO Cell, (**Oct. 1, 1999**) Vol. 99, No. 1, pp. 13-22.
ISSN: 0092-8674.
DT Article
LA English
SL English
AB **Herpes simplex** virus type 1 (**HSV**-1) binds to cells through interactions of viral **glycoproteins** gB and gC with **heparan sulfate** chains on cell surface proteoglycans. This binding is not sufficient for viral entry, which requires fusion between the viral envelope and cell membrane. Here, we show that **heparan sulfate** modified by a subset of the multiple **D**-glucosaminyl **3-O-sulfotransferase** isoforms provides sites for the binding of a third viral **glycoprotein, gD**, and for initiation of **HSV**-1 entry. We conclude that susceptibility of cells to **HSV**-1 entry depends on (1) presence of **heparan sulfate** chains to which virus can bind and (2) 3-O-sulfation of specific glucosamine residues in **heparan sulfate** to generate **gD** -binding sites or the expression of other previously identified **gD** -binding receptors.
CC Medical and Clinical Microbiology - Virology *36006
Cytology and Cytochemistry - Animal *02506
Cytology and Cytochemistry - Human *02508
Biophysics - Membrane Phenomena *10508
Enzymes - General and Comparative Studies; Coenzymes *10802
Physiology and Biochemistry of Bacteria *31000

BC **Herpesviridae 02612**
Animalia - Unspecified 33000
Hominidae 86215
IT Major Concepts
Enzymology (Biochemistry and Molecular Biophysics); Infection; Membranes (Cell Biology)
IT Parts, Structures, & Systems of Organisms
viral envelope
IT Diseases
herpes simplex virus 1 infection: viral disease
IT Chemicals & Biochemicals
gB [**glycoprotein** B]; gC [**glycoprotein** C]; **gD** [**glycoprotein D**]; **D**-glucosaminyl **3-O-sulfotransferase**; 3-O-sulfated **heparan sulfate**
IT Miscellaneous Descriptors
viral entry
ORGN Super Taxa
Animalia; **Herpesviridae: Animal Viruses, Viruses, Microorganisms**; Hominidae: Primates, Mammalia, Vertebrata, Chordata, Animalia
ORGN Organism Name
animal (Animalia): host; **herpes simplex virus 1 (Herpesviridae): entry, pathogen**; human (Hominidae): host
ORGN Organism Superterms
Animal Viruses; Animals; Chordates; Humans; Mammals; Microorganisms; Primates; Vertebrates; Viruses
RN **9050-30-0 (HEPARAN SULFATE)**

L190 ANSWER 5 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.
AN 1997:393831 BIOSIS
DN PREV199799693034
TI **Glycoprotein D** of **herpes simplex** virus (**HSV**) binds directly to HVEM, a member of the tumor necrosis factor receptor superfamily and a mediator of **HSV** entry.
AU Whitbeck, J. Charles (1); Peng, Charline; Lou, Huan; Xu, Ruliang; Willis, Sharon H.; Ponce De Leon, Manuel; Peng, Tao; Nicola, Anthony V.; Montgomery, Rebecca I.; Warner, Morgyn S.; Soulika, Athena M.; Spruce, Lynn A.; Moore, William T.; Lambris, John D.; **Spear, Patricia G.**; Cohen, Gary H.; Eisenberg, Roselyn J.
CS (1) Sch. Dental Med., Univ. Pennsylvania, Philadelphia, PA 19104 USA
SO Journal of Virology, (1997) Vol. 71, No. 8, pp. 6083-6093.
ISSN: 0022-538X.
DT Article
LA English
AB **Glycoprotein D** (**gD**) is a structural component of the **herpes simplex** virus (**HSV**) envelope which is essential for virus entry into host cells. Chinese hamster ovary (CHO-K1) cells are one of the few cell types which are nonpermissive for the entry of many **HSV** strains. However, when these cells are transformed with the gene for the **herpesvirus** entry mediator (HVEM), the resulting cells, CHO-HVEM12, are permissive for many **HSV** strains, such as **HSV-1**(KOS). By virtue of its four cysteine-rich pseudorepeats, HVEM is a member of the tumor necrosis factor receptor superfamily of proteins. Recombinant forms of **gD** and HVEM, **gD-1**(306t) and HVEM(200t), respectively, were used to demonstrate a specific physical interaction between these two proteins. This interaction was dependent on native **gD** conformation but independent of its N-linked **oligosaccharides**, as expected from previous structure-function studies. Recombinant forms of **gD** derived from **HSV-1**(KOS)rid1 and **HSV-1**(ANG) did not bind to HVEM(200t), explaining the inability of these viruses to infect

CHOHVEM12 cells. A variant **gD** protein, **gD** -1(DELTA-290-299t), showed enhanced binding to HVEM(200t) relative to the binding of **gD**-1(306t). Competition studies showed that **gD**-1(DELTA-290-299t) and **gD**-1(306t) bound to the same region of HVEM(200t), suggesting that the differences in binding to HVEM are due to differences in affinity. These differences were also reflected in the ability of **gD**-1(DELTA-290-299t) but not **gD** -1(306t) to block **HSV** type 1 infection of CHO-HVEM12 cells. By gel filtration chromatography, the complex between **gD** -1(DELTA-290-299t) and HVEM(200t) had a molecular mass of 113 kDa and a molar ratio of 1:2. We conclude that HVEM interacts directly with **gD**, suggesting that HVEM is a receptor for virion **gD** and that the interaction between these proteins is a step in **HSV** entry into HVEM-expressing cells.

CC Cytology and Cytochemistry - Animal *02506
Biochemical Studies - Proteins, Peptides and Amino Acids *10064
Biochemical Studies - Carbohydrates *10068
Biophysics - Molecular Properties and Macromolecules *10506
In Vitro Studies, Cellular and Subcellular *32600
Virology - Animal Host Viruses *33506
Medical and Clinical Microbiology - Virology *36006

BC **Herpesviridae 02612**
Cricetidae *86310

IT Major Concepts
Biochemistry and Molecular Biophysics; Cell Biology; Infection; Microbiology

IT Miscellaneous Descriptors
BINDING; BIOCHEMISTRY AND BIOPHYSICS; **GD**; **GLYCOPROTEIN D**; **HERPESVIRUS** ENTRY MEDIATOR; **HSV**; HVEM; INFECTION; STRAIN-KOS; TUMOR NECROSIS FACTOR RECEPTOR SUPERFAMILY MEMBER; VIRAL ENTRY

ORGN Super Taxa
Cricetidae: Rodentia, Mammalia, Vertebrata, Chordata, Animalia; **Herpesviridae: Viruses**

ORGN Organism Name
herpes simplex virus (Herpesviridae); CHINESE HAMSTER OVARY (Cricetidae): cell line; CHO-K1 (Cricetidae): cell line

ORGN Organism Superterms
animals; chordates; mammals; microorganisms; nonhuman mammals; nonhuman vertebrates; rodents; vertebrates; viruses

L190 ANSWER 6 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.
AN **1989:95344** BIOSIS
DN **BA87:49480**
TI INITIAL INTERACTION OF **HERPES SIMPLEX** VIRUS WITH CELLS IS BINDING TO **HEPARAN SULFATE**.
AU WUDUNN D; **SPEAR P G**
CS DEP. MICROBIOL./IMMUNOL., NORTHWESTERN UNIV. MED. SCH., CHICAGO, ILL. 60611.
SO J VIROL, (1989) 63 (1), 52-58.
CODEN: JOVIAM. ISSN: 0022-538X.
FS BA; OLD
LA English
AB We have shown that cell surface **heparan sulfate** serves as the initial receptor for both serotypes of **herpes simplex** virus (**HSV**). We found that virions could bind to heparin, a related glycosaminoglycan, and that heparin blocked virus adsorption. Agents known to bind to cell surface **heparan sulfate** blocked viral adsorption and infection. Enzymatic digestion of cell surface **heparan sulfate** but not of dermatan **sulfate** or chondroitin **sulfate** concomitantly reduced the binding of virus to the cells and rendered the cells resistant to infection. Although cell surface **heparan**

sulfate was required for infection by **HSV** types 1 and 2, the two serotypes may bind to **heparan sulfate** with different affinities or may recognize different structural features of **heparan sulfate**. Consistent with their broad host ranges, the two **HSV** serotypes use as primary receptors ubiquitous cell surface components known to participate in interactions with the extracellular matrix and with other cell surfaces.
CC Cytology and Cytochemistry - Human *02508
Biochemical Studies - Carbohydrates *10068
Biophysics - Membrane Phenomena 10508
Virology - Animal Host Viruses *33506
Medical and Clinical Microbiology - Virology *36006
BC **Herpetoviridae** and/or **Herpesviridae** 02220
Hominidae 86215
IT Miscellaneous Descriptors
HUMAN EXTRACELLULAR MATRIX
RN **9050-30-0 (HEPARAN SULFATE)**

L190 ANSWER 7 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.
AN **1988:408531** BIOSIS
DN **BR35:71506**
TI CELL SURFACE RECEPTOR FOR **HERPES SIMPLEX** VIRUS IS **HEPARAN SULFATE**.
AU WUDUNN D; **SPEAR P G**
CS UNIV. CHICAGO, CHICAGO, ILL. 60611.
SO SYMPOSIUM ON CELL BIOLOGY OF VIRUS ENTRY, REPLICATION AND PATHOGENESIS HELD AT THE 17TH ANNUAL UCLA (UNIVERSITY OF CALIFORNIA-LOS ANGELES) MEETING ON MOLECULAR AND CELLULAR BIOLOGY, TAOS, NEW MEXICO, USA, FEBRUARY 28-MARCH 5, 1988. J CELL BIOCHEM SUPPL. (1988) 0 (12 PART C), 23.
CODEN: JCBSD7.
DT Conference
FS BR; OLD
LA English
CC General Biology - Symposia, Transactions and Proceedings of Conferences, Congresses, Review Annuals 00520
Cytology and Cytochemistry - Human *02508
Biochemical Studies - Proteins, Peptides and Amino Acids 10064
Biochemical Studies - Carbohydrates 10068
Biophysics - Membrane Phenomena *10508
Metabolism - Carbohydrates *13004
Metabolism - Proteins, Peptides and Amino Acids *13012
Virology - Animal Host Viruses 33506
Medical and Clinical Microbiology - Virology *36006
BC **Herpetoviridae** and/or **Herpesviridae** 02220
Hominidae 86215
IT Miscellaneous Descriptors
ABSTRACT HUMAN HEPARIN GLYCOSAMINOGLYCANS
RN 9005-49-6 (HEPARIN)
9050-30-0 (HEPARAN SULFATE)

L190 ANSWER 8 OF 8 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC.
AN 1983:288715 BIOSIS
DN BA76:46207
TI O LINKED OLIGO **SACCHARIDES** ARE ACQUIRED BY **HERPES SIMPLEX** VIRUS **GLYCO PROTEINS** IN THE GOLGI APPARATUS.
AU JOHNSON D C; **SPEAR P G**
CS DEP. MICROBIOL., UNIV. CHICAGO, CHICAGO, IL 60637.
SO CELL, (1983) 32 (3), 987-998.
CODEN: CELLB5. ISSN: 0092-8674.
FS BA; OLD
LA English
AB The O-linked **oligosaccharides** on mature forms of **herpes**

simplex virus type 1 (**HSV1**) **glycoproteins** were characterized, and were found to account largely for the lower electrophoretic mobilities of these forms relative to the mobilities of immature forms. Other posttranslational modifications of **HSV1 glycoproteins** (designated gB, gC, **gD** and gE) were related temporally to the discrete shifts in electrophoretic mobilities that signal acquisition of the O-linked **oligosaccharides**. Fatty acid acylation (principally of gE) could be detected just prior to the shift; conversion of high-mannose type N-linked **oligosaccharides** to the complex type occurred coincident with the shifts. The addition of O-linked **oligosaccharides** did not occur in cells treated with the ionophore monensin or in a ricin-resistant cell line defective in the processing of N-linked **oligosaccharides**. Evidently, extension of O-linked **oligosaccharide** chains on **HSV1 glycoproteins**, and probably also attachment of the first O-linked sugars, occurs as a late posttranslational modification in the Golgi apparatus. [Human laryngeal carcinoma Hep-2 cells were used in this study.]

CC Cytology and Cytochemistry - Human *02508
Biochemical Methods - Nucleic Acids, Purines and Pyrimidines 10052
Biochemical Methods - Lipids 10056
Biochemical Studies - General 10060
Biochemical Studies - Proteins, Peptides and Amino Acids *10064
Biochemical Studies - Lipids 10066
Biochemical Studies - Carbohydrates *10068
Replication, Transcription, Translation 10300
Biophysics - Molecular Properties and Macromolecules *10506
Biophysics - Membrane Phenomena 10508
Metabolism - Carbohydrates 13004
Metabolism - Lipids 13006
Metabolism - Proteins, Peptides and Amino Acids 13012
Respiratory System - General; Methods 16001
Pharmacology - Drug Metabolism; Metabolic Stimulators 22003
Neoplasms and Neoplastic Agents - Neoplastic Cell Lines 24005
Genetics of Bacteria and Viruses 31500
Tissue Culture, Apparatus, Methods and Media 32500
Virology - Animal Host Viruses *33506
Chemotherapy - General; Methods; Metabolism 38502
Plant Physiology, Biochemistry and Biophysics - Chemical Constituents 51522

BC Animal Viruses - Unspecified 02200
Fungi - Unspecified 15000
Hominidae 86215

IT Miscellaneous Descriptors
POST TRANSLATIONAL MODIFICATION FATTY-ACID ACYLATION MONENSIN RICIN METABOLIC-DRUG

RN 17090-79-8 (MONENSIN)

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(FILE 'HOME' ENTERED AT 14:58:12 ON 06 JUL 2003)
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FILE 'HCAPLUS' ENTERED AT 14:58:22 ON 06 JUL 2003
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L1 1 S E3
E US99-150743/AP,PRN
L2 1 S E5
E US2000-175347/AP,PRN
L3 1 S E5
L4 1 S L1-L3
E SHUKLA D/AU

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L5          168 S E3-E12,E15,E16
                E ROSENBURG R/AU
L6            2 S E3,E4
                E ROSENBERG R/AU
L7          402 S E3,E8,E34,E40
                E SPEAR P/AU
L8          142 S E3,E6,E9,E10
L9            1 S L4 AND L5-L8
                SEL RN

     FILE 'REGISTRY' ENTERED AT 15:02:48 ON 06 JUL 2003
L10          14 S E1-E14
L11           6 S 67-68-5 OR 57-55-6 OR 67-63-0 OR 64-17-5 OR 112-80-1 OR 872-5
L12           1 S 9050-30-0
L13          14 S (70226-44-7 AND 7664-93-9)/CRN
L14           3 S L13 AND (CA OR NA OR K)/ELS AND 3/NC
L15           4 S L12,L14
L16           7 S L10 NOT L11-L15
L17           3 S L16 AND SQL/FA
L18           4 S L16 NOT L17
L19           1 S L18 AND UNSPECIFIED
L20           3 S L18 NOT L19

     FILE 'HCAPLUS' ENTERED AT 15:11:23 ON 06 JUL 2003
L21         703 S L5-L8 NOT L9

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L22         SEL L21 1- RN :    1245 TERMS
                SET SMARTSELECT OFF

     FILE 'HCAPLUS' ENTERED AT 15:12:08 ON 06 JUL 2003
L24         703 S L21 OR L21
                SEL AN L24 1-200
L25         200 S E15-E406
                SEL AN L24 201-400
L26         200 S E407-E803
                DEL SEL
                SEL AN L24 401-600
L27         200 S E1-E400
                SEL AN L24 601-703
L28         103 S E401-E606

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     FILE 'HCAPLUS' ENTERED AT 15:15:14 ON 06 JUL 2003
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L29         SEL L25 1- RN :     751 TERMS
                SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 15:15:16 ON 06 JUL 2003
L30         751 S L29

     FILE 'HCAPLUS' ENTERED AT 15:15:29 ON 06 JUL 2003
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L31         SEL L26 1- RN :     321 TERMS
                SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 15:15:31 ON 06 JUL 2003
L32         322 S L31

     FILE 'HCAPLUS' ENTERED AT 15:15:40 ON 06 JUL 2003
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L33          SEL L27 1- RN :      246 TERMS
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     FILE 'REGISTRY' ENTERED AT 15:15:41 ON 06 JUL 2003
L34          246 S L33

     FILE 'HCAPLUS' ENTERED AT 15:15:49 ON 06 JUL 2003
                 SET SMARTSELECT ON
L35          SEL L28 1- RN :      108 TERMS
                 SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 15:15:50 ON 06 JUL 2003
L36          108 S L35
L37         1245 S L30,L32,L34,L36
L38         1241 S L37 NOT L10
L39           58 S L38 AND OC5/ES
L40          188 S L38 AND S/ELS
L41          333 S L38 AND UNSPECIFIED
L42          144 S L41 NOT SQL/FA
L43            8 S L42 AND SULFOTRANSFERASE
L44            1 S L43 AND 3
L45          184 S L40 NOT L41
L46           54 S L45 AND L39
L47           14 S L46 NOT SULFOAMINO
L48            1 S L47 AND C12H21NO14S
L49          130 S L45 NOT L46
L50           96 S L49 NOT SQL/FA
L51            4 S L39 NOT L46-L50
L52            5 S L38 AND ?GLUC?/CNS NOT L39-L51
L53            1 S L20 AND OC5/ES
L54              STR
L55            0 S L54
L56              STR L54
L57            0 S L56
L58              STR L56
L59            0 S L58
L60           16 S L58 FUL
                 SAV L60 MAIER069/A
L61            1 S L60 AND C12H21NO20S3
                 SAV L61 MAIER069A/A
                 E C6H13NO11S2/MF
L62            9 S E3
L63            3 S L62 NOT SULFOAMINO
L64            2 S L63 NOT IDS/CI
L65            1 S L64 AND 3
L66              STR L58
L67            9 S L66
L68          224 S L66 FUL
                 SAV L68 MAIER069B/A
L69              STR L66
L70            0 S L69 SAM SUB=L68
L71            4 S L69 FUL SUB=L68
                 SAV L71 MAIER069C/A
L72              STR L69
L73           30 S L72 FUL SUB=L68
                 SAV L73 MAIER069D/A
L74           26 S L73 NOT L71,L65
L75            1 S L74 AND C12H21NO20S3

     FILE 'HCAPLUS' ENTERED AT 16:04:08 ON 06 JUL 2003
L76            5 S L61,L65,L75
L77            2 S L76 AND (PY<=1999 OR PRY<=1999 OR AY<=1999)
L78           19 S 3 OST
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L79          67 S 3 O ()(SULFOTRANSFERASE OR SULPHOTRANSFERASE OR (SULFO OR SUL
L80          70 S L78,L79
L81           5 S L80 (L) 3A
L82           4 S L80 (L) 3B
L83           7 S L81,L82
L84          21 S L80 AND L12
L85          40 S L80 AND HEPARAN()(SULFATE OR SULPHATE)
L86          40 S L84,L85
L87           4 S 3OST#
L88          42 S L83,L86,L87
L89          42 S L80 AND L88
L90          28 S L80 NOT L89
L91           1 S L90 AND HERPES SIMPLEX
                SEL RN L89
                DEL SEL

     FILE 'REGISTRY' ENTERED AT 16:12:03 ON 06 JUL 2003

     FILE 'HCAPLUS' ENTERED AT 16:12:03 ON 06 JUL 2003
                SET SMARTSELECT ON
L92           SEL L89 1- RN :    4962 TERMS
                SET SMARTSELECT OFF

     FILE 'REGISTRY' ENTERED AT 16:12:06 ON 06 JUL 2003
L93        4962 S L92
L94          63 S L93 AND (?SULFOTRANSFERASE? OR ?SULPHOTRANSFERASE?)/CNS
L95          61 S L94 AND (SULFOTRANSFERASE OR SULPHOTRANSFERASE)/INS.HP
L96           2 S L94 NOT L95
L97          47 S L95 AND 3
L98          13 S L95 AND (3A OR 3B)
L99          47 S L97,L98
L100         14 S L95 NOT L99
L101         41 S L99 AND (3 OR 3A OR 3B)/INS.HP
L102          6 S L99 NOT L101
L103          2 S L102 NOT (SQL/FA OR STEROID)
L104         38 S L101 AND HEPAR?
L105          3 S L101 NOT L104
L106          2 S L105 AND 3 O
L107         19 S L104 AND 3 O
L108          1 S L107 NOT (CLONE OR MUS OR MOUSE)
L109         19 S L104 NOT L107
L110          2 S L19,L103
L111        909 S SULFOTRANSFERASE OR SULPHOTRANSFERASE
L112        846 S L111 NOT L94
L113        136 S L112 AND 3
L114         13 S L112 AND 3 O
L115        123 S L113 NOT L114
L116          0 S L112 AND (3A OR 3B)

     FILE 'HCAPLUS' ENTERED AT 16:22:51 ON 06 JUL 2003
L117         34 S L110
L118         31 S L117 AND L78-L90
L120         15 S HEPARAN()(SULFATE OR SULPHATE)()(3 OR 3 O)()(SULFOTRANSFERASE
L121         73 S L78-L90,L117-L120
L122          6 S L121 AND ?HERPE?
                E HERPES/CT
                E E31+ALL
L123       2969 S E2
                E E2+ALL
L124       4254 S E8
L125          9 S E6
                E E6+ALL
L126       7223 S E9,E12
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                E E9+ALL
L127       10903 S E7,E9-E26/BI
L128        4250 S L12
L129        7432 S HEPARAN()(SULFATE OR SULPHATE)
L130       11444 S L123-L127
L131          39 S L130 AND L128
L132          82 S L130 AND L129
L133           1 S L77 AND L121
L134           1 S L77 AND L130
L135           2 S L77,L133,L134
                E GLYCOPROTEIN/CT
L136         691 S E186,E187
L137        1024 S (GLYCOPROTEIN OR GP)(L)GD
L138           3 S L136,L137 AND L121
L139         672 S L136,L137 AND L130
L140         926 S L136,L137 AND (?HERPE? OR HSV?)
L141         708 S L139,L140 AND (PY<=1999 OR PRY<=1999 OR AY<=1999)
L142           0 S L141 AND (OVERSULFAT? OR OVERSULPHAT?)
                E SULFATION/CT
                E E3+ALL
L143           1 S L141 AND E3
L144          28 S L141 AND ?SACCHARIDE?
L145         130 S L5-L8 AND (?HERPE? OR HSV? OR L123-L127)
L146           6 S L145 AND ?SACCHARID?
L147          15 S L145 AND L128,L129
L148           4 S L145 AND L121
L149          19 S L146-L148
L150          15 S L149 AND (PY<=1999 OR PRY<=1999 OR AY<=1999)
L151           4 S L149 NOT L150
L152          20 S L150,L151,L135
L153         111 S L145 NOT L152
L154          10 S L152 AND (D OR GD)
L155          10 S L152 NOT L154
L156         163 S L129,L128 AND E3+NT
L157           2 S L156 AND L123-L127
L158           2 S L156 AND (?HERPE? OR HSV?)
L159           2 S L157,L158
L160          11 S L159,L154

     FILE 'REGISTRY' ENTERED AT 16:47:23 ON 06 JUL 2003

     FILE 'HCAPLUS' ENTERED AT 16:48:24 ON 06 JUL 2003
             SEL HIT RN L160

     FILE 'REGISTRY' ENTERED AT 16:50:00 ON 06 JUL 2003
L161           4 S E1-E4

     FILE 'BIOSIS' ENTERED AT 16:50:51 ON 06 JUL 2003
                E SHUKLA D/AU
L162         238 S E3-E11,E13
                E ROSENBERG R/AU
L163         457 S E3,E7
L164         156 S E31,E34
                E ROSENBURG R/AU
L165           8 S E3,E4
                E SPEAR P/AU
L166         175 S E3,E6,E11,E12,E13
L167        1021 S L162-L166
L168         168 S L167 AND (?HERPE? OR HSV? OR SIMPLEX)
L169          59 S 02612/BC AND L167
L170         168 S L168,L169
L171          16 S L170 AND (L12 OR L129)
L172           5 S L170 AND L121
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L173          0 S L61,L65,L75,L71
L174         17 S L171,L172
L175         11 S L174 AND PY<=1999
L176        139 S L170 AND PY<=1999
L177          5 S L170 AND ?SACCHARID?
L178          4 S L176 AND L177
L179          3 S L178 AND (GD OR D)(L)(GP OR GLYCOPROTEIN OR GLYCO PROTEIN)
L180          2 S L179 NOT 75000/TI
L181          7 S L175 AND (GP OR GLYCOPROTEIN OR GLYCO PROTEIN)
L182          1 S L181 AND (GD OR D)
L183          3 S L180,L182
L184          6 S L181 NOT L183
L185          9 S L174 NOT L177-L184
                SEL DN AN 3 4 5 8 9
L186          5 S L185 AND E1-E10
L187          8 S L183,L186
L188        124 S L176 NOT L177-L187
L189          8 S L187 AND L162-L188
L190          8 S L189 AND (D OR GD OR GLYCOPROTEIN OR GLYCO PROTEIN OR ?SULFOT

     FILE 'BIOSIS' ENTERED AT 17:05:28 ON 06 JUL 2003
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